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The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

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Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

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Front Cover. Lund, Sweden, venue of the 35th IUPAC General Assembly.

1990 International Union of Pure and Applied Chemistry

35th IUPAC General Assembly

Over 700 scientists from more than 40 countries attended the 35th IUPAC General Assembly held at the University of Lund, Sweden from the 9th to 17th August, 1989.

Restructuring

Restructuring of the Union was one of the major topics discussed and was the main feature of President Valentin Koptyug's "State of the Union" report, which he delivered to the IUPAC Council at the end of the General Assembly (see page 7).

At present IUPAC has a vertical structure which includes eight subject-oriented divisions/sections. In the proposed restructuring each division and its commissions will pursue core activities as well as link into horizontal mission-oriented interdivisional programmes on topics such as the environment, advanced materials and possibly biosciences/biotechnology. The Union will retain its standing committees, for example: Committee on Chemical Research Applied to World Needs (CHEMRAWN), Committee on Chemical Industry (COCI), Committee on Chemical Databases (CCDB), and Committee on Teaching of Chemistry (CTC).

Council meeting at the 35th IUPAC General Assembly in Lund.

Work on the first mission-oriented programme is already under way. This programme is concerned with **chemistry and the environment**. IUPAC has been actively engaged *ad hoc* in a wide variety of environmental projects over a number of years. These projects have been carried out by several commissions in IUPAC's Divisions of Analytical, Applied and Clinical Chemistry. The following are typical examples of these projects:

- Electrochemical analysis of organic pollutants
- Determination of trace compounds in biological systems
- Use of passive samplers for monitoring ambient air
- World-wide inventory of emissions
- Determination of mercury in foodstuffs
- Aluminium in foods
- Improved cost-effective approaches to pesticide residues analysis
- PCB evaluation in food and other biological samples
- Determination of the pH of acid rain
- Inventory of current tropospheric sampling programmes
- Potential contamination of groundwater by pesticides

CHEMRAWN and COCI

Delegates at the General Assembly heard that the 7th conference in its CHEMRAWN series will be devoted to atmospheric chemistry (Baltimore, Maryland, USA in May, 1991). The CHEMRAWN Committee also announced plans for a 2nd world conference on chemistry and world food supplies and a USSR–Poland sponsored CHEMRAWN conference on ecological problems related to industrial wastes.

Plans are also well advanced for the 1st IUPAC Workshop on **Safety in Chemical Production** (Basel, Switzerland in September, 1990). This workshop, organized by COCI, will provide hands-on experience in chemical plants for participants and will also include lectures and discussions on risk assessment, safety organization and education. Funds are being raised to bring 100 Third-World chemists to the workshop. The total number of participants will be limited to 200.

Another notable feature of the General Assembly was the announcement by the Inorganic Chemistry Division of the publication of a new edition of *Nomenclature of inorganic chemistry* (The Red Book, Part 1). The book includes rules for naming compounds ranging from the simplest molecules to oxoacids and their derivatives, coordination compounds, and simple boron compounds. Part 2 is now in preparation and will be concerned with more specialized areas such as strand inorganic polymers and polyoxoanions.

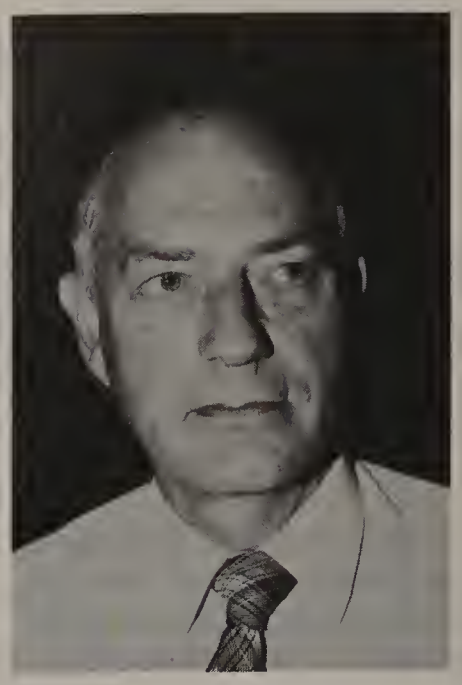
Databases

The Committee on Chemical Databases (CCDB) is collaborating with several commissions and committees in the preparation of chemical databases. One of the highlights of the CCDB meeting in Lund was the testing of the prototype version of a database of IUPAC recommendations which have appeared in the official IUPAC journal, *Pure and Applied Chemistry*, over the past 30 years. The database is being developed by the Publications Committee. CCDB also met with various commissions to discuss other possible databases of chemical data, for example: conductance data, solubility data, stability constants, and thermodynamic properties of elements. A contract between Blackwell Scientific Publications and IUPAC for distribution of the first IUPAC PC computer database was signed. It contains data on the enthalpies of vaporization of organic compounds.

The Committee on Teaching Committee (CTC) has been active in a number of projects, including one on low-cost locally produced equipment throughout the world (see *CI*, Vol 11, No. 4, pp. 127–9, 1989).

Work on other IUPAC commissions and committees continued unabated at Lund and details of these activities will be published in the Commission & Committee News section of forthcoming issues of *CI*.

The President reported that the number of affiliates rose again in 1989. He asked for the assistance of National Adhering Organizations or their approved Chemical Societies to help IUPAC by undertaking recruitment drives in order to broaden IUPAC's base of contact with their chemists and make the Union a more effective force in the international scientific community. There are currently about 7900 affiliates from some 80 countries. IUPAC hopes that affiliate numbers will increase to over 10 000 before the next General Assembly.



Yves Jeannin assumed the IUPAC Presidency at Lund.

At the end of the Council meeting Prof. Yves Jeannin (France) assumed the IUPAC Presidency from Academician Valentin Koptyug (USSR). Jeannin (see *CI*, Vol. 11, No. 5, pp. 200–202, 1989) will serve as President until the next IUPAC General Assembly to be held in the Federal Republic of Germany during August 1991.

During the Council meeting Prof. Allen J. Bard (USA) of the University of Texas, Austin, was elected as IUPAC's new Vice-President. Prof. Bard is an electrochemist of international renown and is editor-in-chief of the *Journal of the American Chemical Society*. He attended the Lund General Assembly as chairman of the US national delegation. He has previously been active in IUPAC on the Commissions of Chemical Kinetics and Electrochemistry (see page 13).

A full report of the general activity of the Council and Bureau at the Lund General Assembly appears in the Secretary General's Column on pages 15–22.

News & Views

70th Anniversary of the Finnish Chemical Society

In April, 1989, the oldest Finnish-speaking chemical society in Finland, The Finnish Chemical Society, held its 70th Anniversary Meeting in Helsinki.

The society is the oldest but one of Finnish chemical societies. The oldest society is Finska Kemistsamfundet, found in 1891. It is a mainly Swedish-speaking chemical society with 552 members.

Suomalaisten Kemistien Seura, the Finnish Chemical Society has 3115 members, and eight local clubs and divisions for chemical education and pesticide chemistry. It is one of the biggest scientific societies in Finland.

The aim of the Finnish Chemical Society is to promote pure and applied chemistry, research, education and industry and to support its members.

The 70th Anniversary Meeting was held in the House of Nobility in Helsinki on the 21st April, 1989. The meeting was attended by numerous members and invited guests of honour. The programme included both speeches and music.

Professor Kyösti Sarkanen at Seattle University was awarded the highest medal of honour of the Finnish Chemical Society, the Gadolin Medal, for his great

The 70th Anniversary Meeting at the House of Nobility, Helsinki (below). (Top): Professor Kyösti Sarkanen (left), receives the Gadolin Medal from Mr Antti Takala, President of the Finnish Chemical Society (right) and Prof. J. Johan Lindberg, Centre of the Gadolin Medal Committee (centre). (*Photos courtesy Stig Nordvik, Helsinki.*)

merits in chemistry and wood chemistry.

Johan Gadolin (1760–1852) was the Finnish chemist who discovered yttria (yttrium oxide). He has been called the father of rare earth metals.

Gadolinium, which is one of the rare earth metals, is named after Johan Gadolin. In honour of Johan Gadolin, the Finnish Chemical Society founded the Gadolin Medal in 1935. The Medal of Honour is given in recognition to a highly distinguished chemist. The medal is made of Finnish gold with a symbolic small quantity of rare earth metal alloyed in it. The gold is donated by the Finnish company Outokumpu Ltd. So

The Association of Finnish Chemical Societies

The Association of Finnish Chemical Societies, Suomen Kemian Seura — Kemiska Sällskapet i Finland, was founded in 1970. It comprises three member societies:

- The Finnish Chemical Society, Suomalaisten Kemistien Seura: founded in 1919. This has 3115 members, eight local clubs, and sections for chemical education and pesticide chemistry.
- The Finnish Society of Chemical Engineers, Kemiallisteknillinen Yhdistys founded in 1970. This has 811 members.
- The Chemical Society of Finland, Finska Kemist-samfundet, founded in 1891. This has 552 members and one local club. It is mainly a Swedish-speaking society.

The aim of the association is: to promote research in chemistry, chemical education, the chemical industry; to act as a cooperative body between the three member societies, and to support and co-ordinate their activities; to represent the three member societies in common matters (such as the IUPAC affiliate membership scheme). The association has 10 chemical sections. It organizes the annual Finnish Chemical Congress and national and international congresses and courses.

The association started operating the IUPAC affiliate membership scheme in 1988 when it recruited 11 Finnish affiliates. The number of affiliates rose to 16 in 1989.

The Gadolin Medal in Finnish gold by Prof. Emil Wikström was founded in 1935 in honour of Johan Gadolin. The medal is donated by the company Outokumpu Ltd. The reverse side (right) shows Johan Gadolin and his students analysing the gadolinite mineral. (*Photos courtesy Stig Nordvik, Helsinki.*)

far, the gold Gadolin Medal has been awarded only eight times.

The meeting invited Professor Osmo Mäkitie to be Honorary President and Vice-Professors Rekki Hakoila and Antti Kivinen to be Honorary Members of the Finnish Chemical Society. Dr Jouni Pursiainen was awarded the Gustav Komppa Prize for the most merited doctoral thesis in chemistry in 1988.

Anneli Varmavuori
Secretary General
Association of Finnish Chemical Society

1989 winners of Canadian IUPAC awards

The Canadian National Committee (CNC) for IUPAC established the CNC/IUPAC awards in 1982. The main purpose of the awards is to assist young scientists who are beginning to establish an international reputation in their field, to participate actively in IUPAC-sponsored meetings. The recommended, but not mandatory, upper age limit for the awardees is 37. Each award contributes to the winner's expenses to present a paper at an IUPAC conference outside North America.

The 1989 winners were Janusz Lusztyk and Mary Anne White. Lusztyk was born and raised in Poland and received his MSc (1973) and PhD (1978) degrees from Warsaw Technical University (Politechnika). He subsequently spent two years (1980–81) at University College London, UK, doing post-doctoral research with Alwyn G. Davies.

In 1982 he joined Keith Ingold at the Chemistry Division of the National Research Council as a research associate and since 1985 he has been a

CNC/IUPAC award winners Janusz Lusztyk (right) and Mary Anne White.

research officer. His current research interests are in the kinetics and mechanisms of free radical reactions. He attended the 32nd IUPAC Congress in Stockholm.

Mary Anne White was born in London, Ontario and obtained a BSc in chemistry from the University of Western Ontario in 1975. In 1979 she completed her PhD at McMaster University under the supervision of the late James A. Morrisson. She then went to Oxford University as a post-doctoral fellow.

She returned to Canada in 1981 to take up a research fellowship in the Department of Chemistry at the University of Waterloo. In 1983 she transferred to Dalhousie University where she is now an associate professor of chemistry and physics.

White's research interests are in the thermal properties of solids. Her research group is especially contributing to the understanding of molecular solids exhibiting orientation disorder. Current interests include phase transformations in such materials, and also thermal conduction in molecular systems. She attended the International Conference on Chemical Thermodynamics and Calorimetry in Beijing, China, August, 1989.

Affiliates at coordination chemistry conference

Gilbert Gordon, who is Volwiler Distinguished Research Professor at the Department of Chemistry, Miami University, Oxford, Ohio, USA, was one of several affiliates who contributed to the 26th International Conference on Coordination Chemistry held in Porto, Portugal. His lecture was published in the May 1989 issue of *PAC* which is reviewed on pages 23–24 of this issue of *CI*.

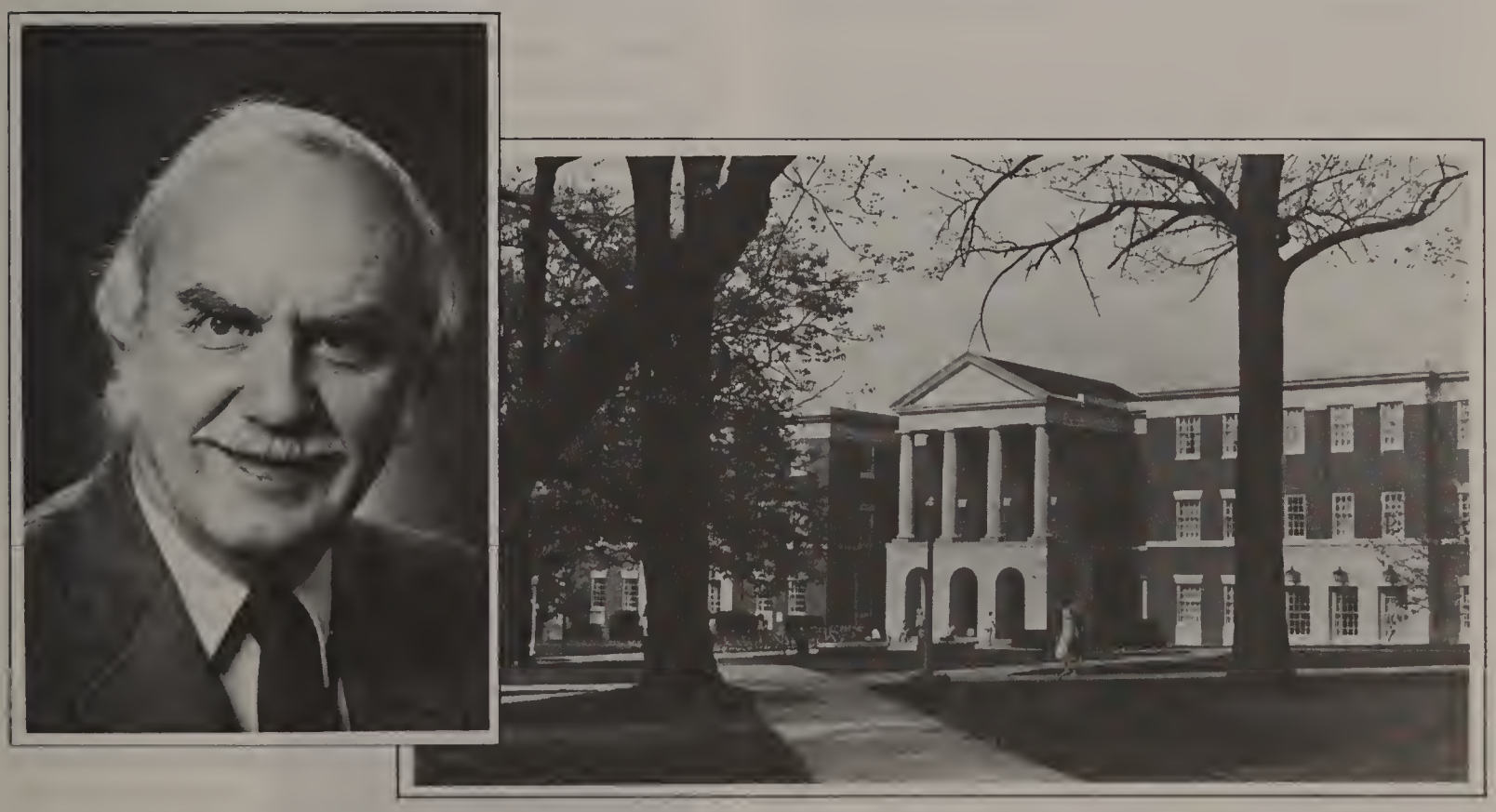
Gordon's lecture on "The role of transition metal ions on oxy-halogen redox reactions" considered some of the reactions and interactions of oxy-halogen species. He pointed out that the formation of highly reactive, complex intermediates is common place in these reactions. However, the role of metal ions on the decomposition of these intermediates is less well understood. Their role is also of primary importance in understanding the microscopic details of most oscillating reactions where non-metal to transition metal electron transfer reactions play a pivotal role.

The Paolo Franzosini Award

As a result of a bequest to the Solubility Data Commission from the family of the late Paolo Franzosini, Professor of Physical Chemistry at the University of Pavia, Italy, the Commission on Solubility Data now has in place the Paolo Franzosini Fund.

The proceeds of this fund are to be used to make an annual award to help a young scientist attend an annual meeting of the commission. Until his untimely death in 1986, Prof. Franzosini was an esteemed member of the commission, and edited Volume 33 of the *Solubility data series: alkali metal alkanoate*.

Congratulations are due to the first recipient of the award, Dr Rumen Duhlev of the Department of General and Inorganic Chemistry, Bulgarian Academy of Sciences, Sofia.



Gilbert Gordon and the Chemistry Building at Miami University. Gordon's research interests include the dynamics of chemical reactions; reactions of chlorine dioxide, chlorine, and ozone; and alternatives to chlorine in water purification mechanisms of reactions of the oxy-halogen species.

The award is open in subsequent years to any young scientist whose research interests are connected with solubility phenomena. Nominations for the award should be addressed to Prof. J. W. Lorimer, Chairman, Solubility Data Commission, Department of Chemistry, The University of Western Ontario, London, Ontario N6A 5B7, Canada before 1st October of each year.

IUPAC Secretariat address change

The address of the IUPAC Secretariat has changed slightly: Cowley Centre has been transformed into Templars Square, Cowley. All correspondence should now be addressed to:

IUPAC Secretariat, Bank Court Chambers,
2–3 Pound Way, Templars Square, Cowley,
Oxford OX4 3YF, UK.

Telex, fax and telephone numbers remain the same.

Swedish chemists up to 1900

A number of typographical errors unfortunately crept into the article on "Swedish luminaries in the ranks of chemistry" by Dr Levi Tansjö (see *CI*, Vol. 11, No. 4, pp. 147–153, 1989):

1. Svante Arrhenius's year of birth was 1859, not 1858 (see p. 147).
2. On page 152, "15 water solutions" should read "1% water solutions".
3. The second city of Sweden should be spelt Gothenburg and not Gothenberg (see pp. 149 and 152).

Thanks to the author for pointing out these errors and for his comments concerning editorial changes made to the typescript following submission. We apologize for these errors and regret that Dr Tansjö was unhappy with the published version of his article.

Names and Addresses

Full details (names, addresses, telephone/telex/fax numbers) of all commission and committee chairpersons and secretaries and IUPAC officers were published in the November 1989 issue of *CI* (Vol. 11, No. 6, 1989). The IUPAC Secretariat has since been notified of the following changes:

Dr C. L. Graham (Co-Secretary, Commission on General Aspects of Analytical Chemistry). Telex: 33 89 38 SPAPHY G.

Dr P. W. Hendrikse (Secretary, Commission on Oils, Fats and Derivatives). Willen de Zwijgerlaan 29, 3136 AR Vlaardingen, Netherlands.

Our planet — our health — think globally — act locally

The World Health Organization (WHO) was born on 7th April, 1948 when its constitution first became effective — with just 61 member states. Every year, 7th April is celebrated as World Health Day by WHO and its member states, which now number 166.

A special subject is chosen as the theme of the day in order to draw attention at the global, national and local levels to a particular public health issue which calls for special attention and action. The theme chosen for the 42nd World Health Day, 7th April, 1990, is environmental health. The slogan "Our plant — our health — think globally — act locally". An information, education and awareness-raising campaign is one of the most important elements of the day. WHO's Division of Information and Public Relations in Geneva can offer a variety of materials related to the theme, and so can the six regional offices of WHO.

For further information apply to: World Health Organization, Division of Public Information and Public Relations Office 5066, CH-1211 Geneva 27, Switzerland.

We regret to record the death of

Prof. R. C. Lord, USA (29 April, 1989) — Physical Chemistry Division Committee (1961–65), Commission on Molecular Structure and Spectroscopy (1957–71).

Dr A. L. G. Rees, Australia (15 August, 1989) — President of IUPAC (1969–71), Committee on Statutes and Bylaws (1972–75), Commission on Nomenclature of Inorganic Chemistry (1963–71), Commission on Physicochemical Data and Standards (1951–65).

The late Dr A. L. G. Rees: IUPAC President, 1969–71

The President's Report

Academician Valentin Koptyug presented his President's Report to Council at the 35th IUPAC General Assembly in Lund. He gave the report the title: "The state and possible ways of restructuring the Union". The following is an abridged version of the report.

Restructuring

In his "State of the Union" report at the Boston General Assembly in 1987, Prof. C. N. R. Rao stressed the importance of restructuring IUPAC in order to stimulate activities in fields associated with new tendencies in chemistry, to demonstrate the effect of chemistry on science and on social progress, and to publicize the place chemistry occupies and the role it plays in science and life.

At a special meeting in Boston, the Bureau decided that the division committees should form forward activity planning groups to prepare brief papers suggesting new areas of activity that IUPAC might undertake in connection with restructuring. These papers were discussed by the Executive Committee in Moscow, May, 1988, and by the Bureau in Oxford in September, 1988. The Bureau issued a memorandum on restructuring of IUPAC, summing up the first stage of these discussions. This memorandum was distributed to all division presidents in December, 1988.

As a result of these discussions, restructuring of the activities of IUPAC divisions has already begun. I would like to specify some of the elements of this restructuring when characterizing the general state of the Union's activities.

Physical Chemistry Division

A new edition of the Green Book, *Quantities, units and symbols in physical chemistry*, was published in 1988. The Green Book was well received. It has been widely and favourably reviewed and is now referred to by several major journals in the fields of physical chemistry and chemical physics as a source of information on the problems of notation.

The monograph *Recommended reference materials for the realization of physicochemical properties* (Editor Dr K. N. Marsh) was published in 1988.

As a new interesting project the international symposium by mail named *Chemistry of oxide superconductors* was initiated. Prof. C. N. R. Rao was its convenor and editor. The papers of this symposium were published in 1988. This project, accomplished within one year, seems to be a good example of IUPAC's adequate response to the emergence of a novel and rapidly developing area of chemistry.

In his report at Lund, President Valentin Koptyug focused on restructuring of the Union and particularly its involvement in environmental projects.

Inorganic Chemistry Division

The most important result of this division is the forthcoming publication of a new edition of the Red Book, *Nomenclature of inorganic chemistry*, Part I. Part II will probably appear around 1992. The publication of the new table on the "Atomic weights of the elements" (1988) must be mentioned here too. A new table on isotopic composition is underway and probably will be published later this year.

As a joint venture with the Division of Clinical Chemistry, a Division Working Party on Isotope Measurements as References for Toxic-Essential Element Assay was established. Isotope-specific methods have now matured to the stage that they can provide "reference values" against which laboratories can then evaluate their routine performance in regular interlaboratory measurement-evaluation programmes.

The division committee is considering possible ways to enter the rapidly developing area of bio-inorganic chemistry.

Organic Chemistry Division

The interesting documents on "Nomenclature for organic chemical transformations and chemical actinometry" were finalized. In addition, a series of international symposia related to different problems of organic chemistry were organized under the sponsorship of IUPAC.

Koptyug (third from left) chairs the Bureau meeting at Lund.

I would like to remind you of the conclusion of the Vice-President's Critical Assessment with respect to this division: "The general impression gained from project revision sheets . . . suggests that it is probably time for Division III to start restructuring".

Macromolecular Division

It is known that this division is well organized and very active. The division has only two commissions, but several working parties and sub-groups. This is a very good way to involve a large number of chemists in IUPAC activities. The division is actively engaged in important new fields, such as liquid crystals, polymers compatible with living systems, membranes, and polymers for information industries. This division may initiate a large inter-divisional programme on "Materials for high technologies".

Efforts have been made by the division committee to promote interactions between IUPAC and chemists world-wide. In particular, it organized a forum on "IUPAC and polymer science" during the 32nd IUPAC International Symposium on Macromolecules (August, 1988, Kyoto). This was a good experiment which may be adopted by other divisions taking into account their specific activities.

Analytical Chemistry Division

The Analytical Chemistry Division has the largest number (eight) of commissions and a large number (about 140) of projects. The level of the commission's activity is high, but, at the same time, as indicated in the Vice-President's Critical Assessment, a lot of projects were started eight to ten or more years ago.

I would like to mention that in the course of the last two years the division programme on "Environmental analytical chemistry" has made remarkable progress. It has already initiated projects on atmospheric pollution, sea, soil and freshwater sediments.

Applied Chemistry Division

This division has been functioning along the same lines. Some steps have been taken to re-align the division during the last two years. It was proposed to divide the division into three subdivisions, oriented to the problems of agriculture, environment and technology.

The Agriculture Subdivision combines the efforts of the Commissions on Food Chemistry, Agrochemicals, and Oils, Fats and Derivatives. The Environment Subdivision includes the Commissions on Atmospheric Chemistry and Water Chemistry. The Technology Subdivision is based on the Biotechnology Commission.

This formation of three principal directions oriented to socially important priorities immediately reveals insufficient efforts on the side of the division and the Union as a whole in the field of new technologies. The problems of resource and power conservation, which humanity faces today, as well as the problems of environmental protection, require generalization, evaluation and distribution of information on new advanced technologies. It is extremely desirable that IUPAC takes part in this important work.

Clinical Chemistry Division

This division has been working along the traditional lines connected with the problems of nomenclature in the area of clinical chemistry techniques and their automation, recommendations for software in new analysers, quantities and units, and teaching in clinical chemistry.

In view of promoting relations with other IUPAC divisions and other international organizations the

activities of the Commission on Toxicology, which is operating as a set of subcommittees on toxicology of various elements, are of utmost interest. The newly formed Subcommittee on Risk Assessment is concerned with the estimation of the health significance of metal concentrations in body fluids and tissues.

Members of the division are involved in the International Programme on Chemical Safety (IPCS), based at the World Health Organization (WHO). A joint IUPAC/IPCS monograph on the *Safe use and disposal of chemicals in laboratories* has been prepared for publication.

Medicinal Chemistry Section

I do not think that the Section on Medicinal Chemistry has found its proper place in the activity of the Union. Efforts to organize work on the standardization of computer graphic research are under way.

It is suggested that a working group is set up to facilitate contacts and exchanges between the natural product laboratories in developing countries and modern pharmaceutical laboratories able to ensure a high-quality pharmacological screening. However, a long-term programme of the section's activity is not clear yet. It seems reasonable that the new Bureau purposefully discusses the matter of the section's prospects. The introduction of chemistry into medicine is an important subject and it should be given proper consideration.

Environmental projects

IUPAC commissions and committees are active in many directions considered as priorities by the world community. Unfortunately, in some cases, our efforts are not yet mission-oriented and are not coordinated enough with the efforts of other international organizations. The former occurs because IUPAC projects are planned mostly "from below", that is by commission members and, to a lesser extent, "from above", that is by division committees and the IUPAC Bureau which is supposed to take into account gaps in the programmes of other international organizations.

To illustrate this, let us consider IUPAC projects dealing with environmental problems. These problems have long been within the scope of the United Nations which tries to ensure the establishment of legal guidelines and principles on the protection of the environment for the entire world community.

I would like to remind you of some examples published in recent years:

- Convention of the protection of the ozone layer (1985)
- Cairo guidelines and principles for the environmentally sound management of hazardous wastes (1987)
- London guidelines for the exchange of information on chemicals in international trade (1987)

Concerning environmental problems. IUPAC will have to become more enthusiastically involved in the activity of the world community — first of all within the framework of the United Nations Environment Programme (UNEP). Among many fields covered by UNEP the following are directly related to the work of our Union:

- Global environmental monitoring
- Industry and environment
- Technology and environment
- Environmental education and training

"Concerning environmental problems, IUPAC will have to become more enthusiastically involved in the activity of the world community."

IUPAC commissions concerned with methods of determining chemical substances in the atmosphere, water, soil and food and also with the toxicology and transformation of chemical substances in the environment, as well as the CHEMRAWN Committee, may all be associated with the above fields.

Several IUPAC commissions are concerned with methods of determining chemical substances in the atmosphere, water, and soil.

Two related regular series of UNEP publications — *Industry and environment guidelines* and *Technical reviews on environmental management of industry* have attracted much attention from industry and the public. It seems reasonable for the Analytical Chemistry and Applied Chemistry Divisions and the Committee on Chemistry and Industry to participate through their projects in the preparation of material on various branches of chemical industry for such reviews.

Another important aspect of IUPAC involvement in international efforts on environmental problems relates to the work of the Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU). The following

SCOPE programmes are especially important for IUPAC:

- Biogeochemical cycles
- Ecotoxicology
- Groundwater contamination

The work of many of our commissions may be co-ordinated with SCOPE activity.

A number of other important ecology-oriented ICSU programmes are of great interest to our Union, for example, the International Geosphere–Biosphere Programme (IGBP). Some sections of this global programme, namely Biogeochemical Cycles, International Global Atmospheric Chemistry Programme, Risk to the Ozone Layer, are of interest to IUPAC too.

Among other important international projects, I would like to mention the International Programme on Chemical Safety which is developed under the aegis of WHO in cooperation with the International Labour Organization (ILO) and UNEP. The publication of the review series *Environmental health criteria* is part of this project.

Horizontal coordination

In the process of considering and approving our commissions' projects related to environmental problems it is necessary to realize their relation to all these international programmes. With these projects being designed and performed in various IUPAC divisions, we are forced to look for their "horizontal coordination" within the framework of our Union.

The term "horizontal coordination" implies the integration of specific mission-oriented projects performed by the commissions of various divisions both within IUPAC and within the programmes of other international organizations. "Vertical coordination" within the branches of chemical science and its applications is the responsibility of the corresponding division committees. "Horizontal coordination" will be possible through the creation of inter-divisional mission-oriented IUPAC programmes.

As the first step in formation of such programmes we should first make an inventory of completed and ongoing projects related to the corresponding programme and to publish a collection of abstracts on these projects. The second step is to determine the problems of utmost significance for the world community which are not yet included in the programmes of other international organizations, and to initiate projects aimed at helping to solve these problems. Finally, it is necessary to ensure effective contacts with other international bodies — in the case of the environment programme, for example, with the ecological programmes of UNEP, SCOPE and so on.

I would like to note that work in this direction in relation to the IUPAC Environment Programme already started. Prof. Tom West, Dr Mo Williams and Dr Michael Freemantle have prepared a draft of a booklet containing abstracts of published IUPAC reports and ongoing projects relating to environmental problems.

At the same time, some topics for new projects have been identified. I would like mention as examples:

- The role of aerosols and hydrosols in the transfer and transformation of chemical substances
- Methods of handling and using chemical wastes
- Environmental education and information

I would also like to underline that the CHEMRAWN series of conferences may play an important role in relation to mission-oriented IUPAC programmes. The Bureau recommends to the Council the starting of the formation of two mission-oriented programmes: (1) the IUPAC Environment Programme; and (2) the IUPAC Programme on Advanced Materials, and to approve main coordinators of these programmes. The Bureau will also take responsibility for looking into the possibility of forming a mission-oriented programme in the area of chemistry and the biosciences.

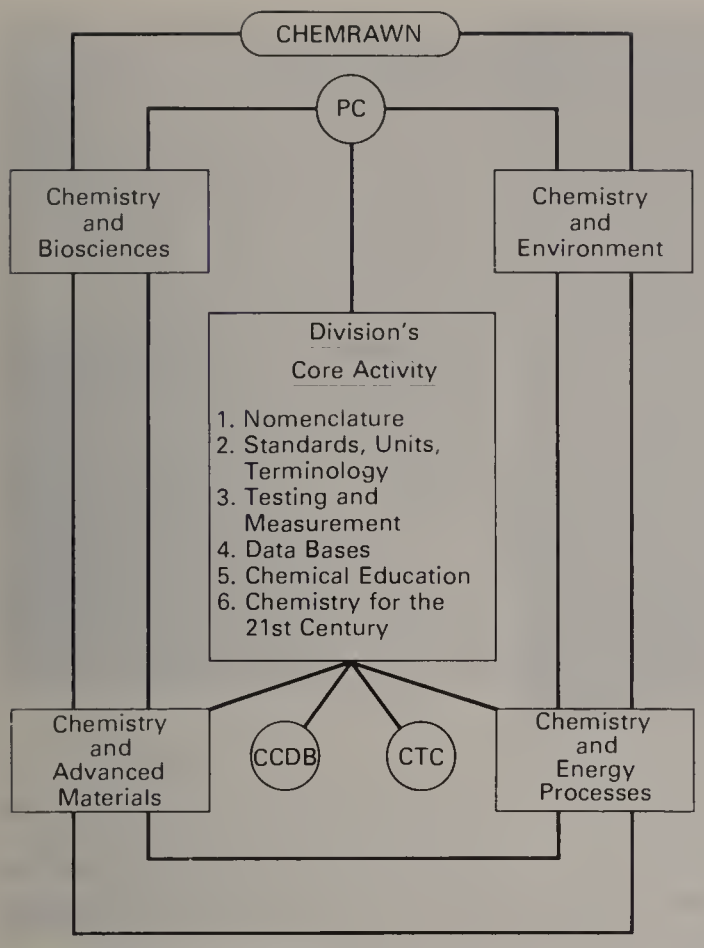
Bureau member Dr Mary Good.

Limited life time commissions

Division committees have proposed, as a result of discussions at Lund, some structural changes inside divisions. In order to help divisions in the reorganization of some commissions and working parties, the Bureau proposes the formation of limited life time commissions.

Taking into account the mission-oriented programmes, the areas of future activity of the Union may be represented by the scheme shown in the figure. This scheme, proposed by Dr Mary Good, reflects at the same time some aspects of a possible new structure of the Union.

In the framework of a new structure of the Union, divisions will have to contribute to the core activity and to the mission-oriented programmes. This scheme demonstrates also the role of the Union's standing committees in the realization of IUPAC mission-oriented programmes.



CHEMRAWN	CHEMical Research Applied to World Needs
PC	Committee on Publications
CCDB	Committee on Chemical Databases
CTC	Committee on Teaching of Chemistry

CHEMRAWN Committee

It should be mentioned first of all that IUPAC's CHEMRAWN Committee (CHEMical Research Applied to World Needs) has already played, and is still playing, a key role in relation to some of the most interesting mission-oriented themes. Thus, for example, its first conference, CHEMRAWN I, was related to raw materials at the time of the world energy crisis. Its most recent conference, CHEMRAWN VI (Japan 1987) was devoted to new materials at the time when the scientific community became aware of new advances in superconductivity. CHEMRAWN activities have therefore effectively foreshadowed the challenge that the Union is now taking up as a whole.

It is of interest to note that the next conference (CHEMRAWN VII) in North America (1991) will be on atmospheric chemistry thus underlining our increasing concern in IUPAC as a whole with environmental matters.

For subsequent meetings, the CHEMRAWN Committee proposes the following topics:

- Chemistry in resolving ecological problems of industry, energies and transportation
- Waste as raw material for the chemical industry
- Safety of chemical plants
- Chemistry and world food supplies

All these topics are considered important and interesting.

Committee on Teaching of Chemistry (CTC)

CTC has continued in the past two years with its traditional activities and initiated some new activities in collaboration with the divisions on one side and with ICSU–CTS on the other.

The committee has an important project in the area of locally produced equipment for chemistry teaching. Several workshops have been organized in Asia, Latin America and Francophone Africa.

CTC distributes worldwide the *International Newsletter on Chemical Education* (two issues per year). The last special issue on safety in schools constitutes the first of a series of IUPAC–CTC monographs on chemical education. A book, *Teaching school chemistry*, was also published with UNESCO.

The committee organizes international conferences on chemical education (1989: Waterloo, Canada) and international symposia in relation with CTC meetings (Rome, Lisbon, Moscow next year).

Among new initiatives, I would like to mention the participation of CTC in an ICSU–CTS project, to produce teaching materials using data from the ICSU Global Change Programme.

CTC Secretary Prof. Krishna Sané is responsible for the project on low-cost equipment for chemical education.

Committee on Chemical Databases

This committee (CCDB) was established in 1985. It is actively working with a number of divisions in forming databases using IUPAC projects (ENTVAPOR, Solubility data, Pesticide properties, Conductance and so on). Drafts of the *Database guidelines* and the *Glossary of terms related to computer applications in chemistry* are under discussion.

Chemistry computerization, according to the Bureau scheme shown in the above figure, should be related to the core activity of IUPAC. I am therefore appealing to all divisions to give it necessary consideration.

A database demonstration during the Lund general assembly.

Publications Committee

The Publication Committee is responsible for providing information on IUPAC activities to the world community of chemists. As I see it, the committee is operating at a high level.

As to the publications of 1988, three works should be mentioned here, namely, the third edition of the Green Book: *Quantities, units and symbols in physical chemistry*; *Determination of trace metals in natural waters*; and *Pesticide metabolism — extrapolation from animals to man*. Eight more volumes appeared in the *Solubility data series*, bring the total to date to 38.

Chemistry for the 21st century

This series was suggested in the course of discussing ways of restructuring IUPAC. The purpose of this initiative is to analyse and forecast the most promising new developments of the chemical sciences and their applications.

The group initiating the first publications in this series includes Dr Mary Good, Prof. John Thomas, Prof. Tom West and Prof. Kirill Zamaraev.

I have already mentioned that the first volume of this series *Chemistry of oxide superconductors* (Editor: Prof. C. N. R. Rao) was published in 1988.

At present work is under way in preparing the following volumes:

- *Perspectives in catalysis* (Eds: Prof. J. M. Thomas and Prof. K. I. Zamaraev)
- *Chemistry of new materials* (Prof. C. N. R. Rao has agreed to be editor)
- *Molecular electronics* (Prof. J. Jortner is considering the possibility of starting work on this volume)

According to the opinion of the Bureau, work in this direction should be related to the core activity of IUPAC and all divisions are called to actively participate in it.

Kirill Zamaraev, who became Physical Chemistry Division President at Lund, is one of the editors of *Perspectives in catalysis* — a volume in the "Chemistry for the 21st Century" series.

Committee on Chemistry and Industry

This committee should be the main link between IUPAC and chemical industry. Committee chairman, Dr Dieter Wyrsch, is taking great pains to make IUPAC more attractive to industry. However, as I see it, the character and essence of possible relations between IUPAC and the chemical industry are not fully clear yet. I think that the new IUPAC bureau should look at this matter in the light of decisions taken during the general assembly on restructuring in IUPAC, particularly in relation to the mission-oriented programmes.

At the same time, I would like to underline that COCI has now reached an advanced stage in planning the

Chemists throughout the world can become voluntarily associated with their international scientific union — IUPAC — through the affiliate membership scheme.

1st IUPAC Workshop on Safety in Chemical Production to be held in Basle, Switzerland, in September, 1990. This is a very good initiative.

IUPAC and the world's chemists

Until the end of 1985 it was not possible for chemists to become voluntarily associated with their international scientific union, IUPAC. In the words of Prof. Zollinger, IUPAC was a closed circle, a self-elected club. In 1986 all that changed with the introduction of the affiliate membership scheme, whereby chemists could, with the approval of their national adhering organization or its approved chemical society, become affiliate members.

Despite increases in membership fees, the number of affiliates has risen again this year, following a small drop after the price rise in 1987. Before AMS was set up there were only about 1400 chemists and 45 countries associated with the Union: now there are about 9000 chemists and 80 countries.

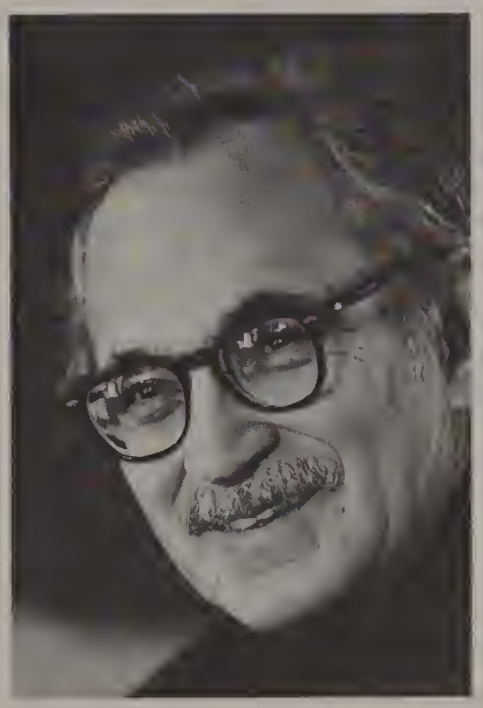
Chemistry International now has a circulation of about 10 000 copies and is published six times per year. It is distributed to all affiliates, divisions, commission and standing committee members. It has become the Union's chief means of disseminating information and keeping chemists world-wide aware of what their Union is doing and planning for the future.

Conclusion

To conclude, I would like to stress that the 35th IUPAC General Assembly should take the principal decision on how IUPAC might be restructured in order to respond more rapidly and effectively to the changing needs of chemistry and chemistry-related sciences, to mankind's needs without losing its ability to perform its present duties. Let me underline that the proposed general scheme should not disrupt the ongoing division programmes: the evolution should be progressive.

Allen Bard elected Vice-President

In Lund, Council voted Prof. Allen J. Bard as IUPAC Vice-President (President-Elect) for the period 1989–91. He will then take over from Prof. Yves Jeannin as IUPAC President for the following two years.



Prof. Allen J. Bard.

Bard was born in 1933. He received his early education in the public schools of New York City and attended The City College of New York where he received a BS summa cum laude in 1955. He did his graduate work at Harvard University with J. J. Lingane and obtained an MA (1956) and PhD (1958) in electroanalytical chemistry. In 1958 he joined the faculty of The University of Texas at Austin where he currently holds the Norman Hackerman/Welch Regents Chair in Chemistry.

His involvement with IUPAC includes service as Vice-Chairman and Titular Member of the IUPAC Commission on Electrochemistry and as a Titular Member of the Commission on Chemical Kinetics. Bard is currently Chairman of the US National Committee.

His research interests have been in the application of electrochemical methods to the study of chemical problems and include investigations in electro-organic chemistry, photochemistry, electrogenerated chemiluminescence, and electroanalytical chemistry. He has published two books and 450 papers and chapters while editing the series *Electroanalytical chemistry* (16 volumes and the *Encyclopedia of the electrochemistry of the elements* (16 volumes). He is currently editor-in-chief of the *Journal of the American Chemical Society*.

Bard is an elected member of the National Academy of Sciences and Past Chairman of the Board on Chemical Sciences and Technology of the National Research Council.

Bureau elections

The following were elected as Bureau members by Council at the Lund General Assembly:

- Ronald D. Brown (Australia)
- Mary L. Good (USA)
- Huang Wei-yuan (Chinese Chemical Society, Beijing)
- Shô Itô (Japan)
- B. Ingemar Wadsö (Sweden)
- Kirill I. Zamaraev (USSR)

Profiles of all these members — except Ronald D. Brown — appeared on pages 156–9 of the July 1989 issue of *CI*.

Prof. R. D. Brown (Australia)

Prof. Ronald D. Brown is Chairman of the Chemistry Department at Monash University. After graduating with a BSc from Melbourne University and obtaining a PhD from London University he held lecturing positions at University College, London, and Melbourne University before being appointed Professor of Chemistry at Monash in 1959.

He was awarded the Masson, Rennie and Smith Medals of the Royal Chemical Institute in 1948, 1951 and 1959, respectively, the David Syme Prize for research by the University of Melbourne in 1959, the Edgeworth–David Medal of the Royal Society of New South Wales in 1961 and the Royal Society Medal of Victoria in 1977. From 1963–64 he was President of the Victorian Badminton Association.

In 1965 he was elected a Fellow of the Australian Academy of Science and has been a member of the Council of the Academy and Vice-President of Physical Sciences. He was elected Secretary of Physical Sciences (Academy of Science) 1976–79. He has been Chairman of the Academy's National Committee for Chemistry and a member of the Subcommittee on Chemical Education, Chairman of the Committee on Science Policy, and is currently a member of the Publications Committee.

Prof. R.D. Brown.

Brown is an internationally known spectroscopist and is active in IUPAC matters, having lead the Australian delegation to IUPAC general assemblies since 1981. He was Australian representative for IUPAC's conference on Teaching of Chemistry in Washington a number of years ago. Currently, he is a Titular Member of the Commission on Molecular Structure and Spectroscopy.

In the International Astronomical Union, Brown is Vice-President of Commission 51 (Biastronomy, Life in Space). He is also a member of the International Halley Watch. He has been a member of Unesco's Australian National Advisory Committee's specialist Committee for Natural Sciences. His current research interests cover theoretical chemistry, spectroscopy, galactochemistry and life in space.

Secretary General's Column

Prof. Tom West

In his report of the Lund General Assembly, Secretary General Tom West comments on the restructuring, IUPAC's environment programme, affiliate membership and various other activities of the Union.

The 35th General Assembly of IUPAC was held at Lund, Sweden, 8–17 August, 1989. During this period, all the commissions, divisions, and standing committees met — sometimes jointly with each other — to complete some projects, to continue with existing ones, and to plan new work to start in the next two years.

The Bureau met, both before and after the Council itself, and finally the new Executive Committee met. In all, over 700 chemists were involved at the Lund assembly.

Secretary General Prof. Tom West.

It is the purpose of this particular column to give a report on the general activity of IUPAC's Council and Bureau at the Assembly rather than to discuss the scientific progress made by the divisions and their commissions. It is, as yet, too early to assess the latter, but the reports of progress made by these bodies will appear in forthcoming issues of *Chemistry International* (*CI*).

State of the Union

In his presidential address (see page 7 of this issue), Academician Valentin Koptyug (USSR) briefly reviewed the advances made by IUPAC's seven divisions, by its new Section on Medicinal Chemistry, and by the various standing committees during the 1987–89 biennium. More particularly, he concentrated on the theme of restructuring the Union, so that it might not only maintain its essential core activities — of which more later — but also be able to respond more rapidly to new topics in chemistry as they emerged and to topics of concern to the world community which involve chemistry.

Outlines of the previous discussions of the Bureau and the Executive Committee in this respect were given in my earlier Secretary General's columns (*CI*, Vol. 11, No. 2, p. 53 and No. 5, p. 182, 1989).

IUPAC goes green?

Prof. Koptyug drew attention to the presidential address (*CI*, Vol. 10, No. 1, p. 25, 1988) of his predecessor, Prof. C. N. R. Rao, at Boston in 1987, which first underlined the need for restructuring, to demonstrate IUPAC's role in the pursuit of chemical research and development, and the place occupied by chemistry in the life of mankind and to protect and improve the global environment.

The President pointed out that, in the latter context, the divisions and commissions of the Union have long been active in this broad area, which is now seen as a priority area by the world community. Generally, the Union previously undertook such activities for their inherent chemical interest, and they were not co-ordinated or programmed overall to be of direct relevance to world needs. However, a publicity-information booklet on environmentally oriented programmes and publications, prepared by Dr Michael Freemantle, Information Officer of the Union, is to be published by the Secretariat.

Also, the Bureau was now recommending to Council, that the Union should take the initiative to focus such activity into a coherent mission-oriented programme of environmental significance. Furthermore, such a programme should be coordinated with those of other international scientific organizations such as UNEP (United Nations Environment Programme) where many programmes, including the following, are very much related to ongoing and planned programmes in our Divisions of Analytical, Applied,

Restructuring is needed to demonstrate IUPAC's role in the pursuit of chemical research and development, and the place occupied by chemistry in life of mankind and to protect and improve the global environment. (*Photo courtesy Per Lindström, Lund.*)

and Clinical Chemistry: Global environment monitoring; Industry and the environment; Technology and the environment; Environmental education and training; Awareness and preparedness for emergencies at local levels.

Similarly, the work of the International Council of Scientific Unions' (ICSU) Scientific Committee on Problems of the Environment (SCOPE) on, for example, biogeochemical cycles, ecotoxicology, groundwater contamination, in which IUPAC has played little part so far, is of direct relevance to many IUPAC programmes. Items of further relevance to the work of IUPAC bodies occur in the programmes of the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO).

The Union was, therefore, introducing a "horizontal" coordinating action on the existing "vertical" divisional programmes, in order to produce a carefully planned mission-oriented effort on "Chemistry and the environment" in the first instance. Further mission-oriented initiatives were contemplated on "Chemistry and advanced materials" and perhaps "Chemistry and energy processes" and "Chemistry and the biosciences".

Bureau and Executive Committee member Dr Mary Good (USA) subsequently expanded and elaborated the theme of mission-oriented IUPAC activities, illustrating graphically the ways in which divisions would maintain the essential IUPAC core activities, such as work on nomenclature; standards, units and terminology; databases; chemical education and so on. A detailed account of Dr Good's exposition has been issued by Dr Dermot O'Sullivan in *Chemical and Engineering News* (page 25, September 18, 1989).

In all of this, the Standing Committee on Chemical Research Applied to World Needs (CHEMRAWN) had acted as a pathfinder within IUPAC by virtue of its mission-oriented world conferences, which cross divisional boundaries and, as will be seen shortly, it is also playing a new role in support of "Chemistry and the environment".

At the same time, the Union's Committee on Chemistry and Industry (COCI) is pioneering relationships and programmes involving chemical industry, though the President felt that the character and essence of future possible relations between IUPAC and the chemical industry could be more fully realized than they were at present. COCI, he said, should also produce a handbook on sources of information about accidents in laboratories, factories, and transportation, as well as "first-aid measures".

Attention NAOs and chemical societies

Turning his attention to other features of the biennium, President Koptyug stressed the need for further improvement of relations between IUPAC and chemists generally. Pointing out that the affiliate membership scheme (AMS), introduced in 1986, had allowed chemists for the first time voluntarily to become associated with their international chemical union, whereas formerly they were completely excluded, he indicated that there were now about 8000 affiliates in some 80 countries of the world. This had resulted, through the regular receipt of *CI*, in the most extensive information dissemination that the Union had ever enjoyed.

Not only was this a cost-effective system, but it was also efficient. The Union was now proposing to put more of its resources into disseminating information via *CI* and had positively underwritten its distribution in developing countries, where otherwise IUPAC had no links. However, such activity depended on the AMS and in this connection he reminded the national adhering organization (NAO) delegates that AMS functioned through their membership organizations or those of their national chemical societies (NCSs). IUPAC is almost entirely dependent, therefore, on their good cooperation if it is to increase the number of affiliates much beyond the present level. He appealed to all NAOs and NCSs, as appropriate, to undertake recruiting drives to increase the number of their affiliates.

City of Lund (left).

Main University Building (below) where the University of Lund held a reception for participants following a concert with "Capella Lundensis" in Lund Cathedral.

LUND

Prof. Ingemar Wadsö, Chairman of the Organizing Committee (above left).

Dr Jan Åke Jönsson, Secretary of the Organizing Committee (above).

Over 700 participants registered at the assembly (left).

National academies and participating chemical societies please note: IUPAC can help you via the Secretariat, but we are dependent on your goodwill and support. We urgently need your further help to extend your affiliate membership programme, thus to maximize the contact (and influence) of your chemists with IUPAC.

"National academies and particularly chemical societies please note: IUPAC can help you via the Secretariat, but we are dependent on your goodwill and support. We urgently need your further help to extend your affiliate membership programme, thus to maximize the contact (and influence) of your chemists with IUPAC."

Council discussions

At the outset, Council, consisting of the delegates of the 37 NAOs present in Lund, stood for one minute in silent commemoration of the death during the biennium of 17 IUPAC chemists, including Past-Presidents Prof. J. Bénard (France) and Dr A. L. G. Rees (Australia). IUPAC is fortunate to have been led by two such distinguished and able chemists: their influences are still felt quite clearly in IUPAC to this day.

IUPAC Elections 1989

Elections, as always, were of considerable interest. Prof. Allen J. Bard of the University of Texas at Austin (USA) was elected Vice-President (President-Elect) by a handsome majority from an impressively strong field of four candidates.

Council decided to increase the number of vacancies on the Bureau from five to six and from a list of 12 eminent candidates the following were elected (those marked * are re-elections for a second, and final, period of four years):

Prof. R. D. Brown (Australia)
Dr Mary L. Good (USA)*
Prof. S. Itô (Japan)*
Prof. I. Wadsö (Sweden)*
Prof. K. I. Zamaraev (USSR)

These new members will serve until 1993, together with the following Bureau members who serve until 1991:

Prof. A. J. Arvia (Argentina)
Prof. G. Modena (Italy)
Prof. M. T. Beck (Hungary)
Prof. N. Sheppard (UK)
Prof. J. Jortner (Israel)
Prof. H. A. Staab (FRG)

The following division/section presidents were approved by the Council, and will serve with the above elected members and the Union officers plus past-Presidents on the Bureau:

Division of Physical Chemistry (I)	Prof. G. M. Schneider
Division of Inorganic Chemistry (II)	Prof. E. Fluck (FRG)
Division of Organic Chemistry (III)	Prof. Irina P. Beletskaya (USSR)
Macromolecular Division (IV)	Prof. W. Heitz (FRG)
Division of Analytical Chemistry (V)	Prof. G. den Boef (Netherlands)
Division of Applied Chemistry (VI)	Dr L. E. Coles (UK)
Division of Clinical Chemistry (VII)	Prof. N. Montalbetti (Italy)
Section of Medicinal Chemistry	Prof. C. G. Wermuth (France)

Profs Fluck and Wermuth continue to serve from the previous biennium. At its meeting immediately after the end of the Council, the new Bureau re-elected Dr Good and Prof. Itô to serve as their representatives on the Executive Committee with Prof. Sheppard (UK). These three, together with (now) Past-President Koptyug, President Jeannin, Vice-President Bard, Treasurer Björkman and Secretary General West, constitute the Executive Committee of the Union for the period 1989–91.

Valete[†]

Council expressed its thanks to the previous Past-President, Prof. Rao (India) and Prof. A. D. Campbell (New Zealand), now both retiring from the Bureau, for their invaluable services over the past few years.

Upon taking over the presidency from Academician Koptyug, Prof. Yves Jeannin (France) expressed his admiration for his predecessor's contributions to the Union and commented with regret that the statutory two-year period of the presidency had robbed the Union of his wise leadership just as he was developing its restructuring. "It's really too soon", he said, and nobody in the Council disagreed. Fortunately, Prof. Koptyug consented to act as the main coordinator in the new "Chemistry and the environment" mission-oriented activity and to represent the Union on SCOPE and at relevant UNEP meetings.

[†] (Editor's note) The Secretary General's command of Latin is impressive. Readers with a less impressive command of the language who aspire to such linguistic skills will be interested to note that *valete* means, in common English, "farewell". For the further edification of such readers, the Secretary General has also included other Latin phrases in this column, for example, *de facto* (which in fact means "actually" — or "in fact") and *primus inter pares*.

Council listens intently to the Secretary General's report.

Primus inter pares

At this point, I would like to take advantage of my privileged position as author of the Secretary General's column to say a very special word of thanks to those division presidents who retired from office in Lund. Kirill Zamaraev (USSR) of Division I — now serving as an elected member of Bureau, Sukh Dev (India) of Division III, Takeo Saegusa (Japan) of Division IV, George Nancollas (USA) of Division V, Philip Kearney (USA) of Division VI, and Stanley Brown (UK) of Division VII.

They were indeed, as the subheading suggests "first amongst equals" and few former division presidents could disagree that presidencies have been of pivotal importance during the past two critical years. They took everything that restructuring involved in their stride, explained it all to their divisions, and were responsible for making the crucial plans which should serve IUPAC and the international scientific community well in the coming years.

Council accepts increase in national subscriptions

On the financial scene, Council accepted that after a period of six years during which IUPAC had not increased national subscriptions, it was now necessary to raise them by 10% over the coming biennium, even though the immediate costs of restructuring would be taken from assets.

The Treasurer's well-argued and clearly presented account of the Union's financial position was accepted without demur and readily approved. However, Romania's removal from membership because of non-payment of its national subscriptions was accepted with regret, and the withdrawal of voting rights from Belgium for failure to pay an outstanding subscription in time was noted with apprehension.

New member countries, welcomed to IUPAC, were Ethiopia, Kuwait, and Nigeria, thus bringing the total to 46.

Delegates to Council: (above) Dr Nader Al-Jalal (left) and Prof. Mubarak Al-Obadie (both Kuwait) and (below) Berhane Mewa (Ethiopia). Council welcomed Ethiopia, Kuwait and Nigeria as new member countries.

Critical assessment of divisional work

The Vice-Presidential Critical Assessment of the work of IUPAC bodies by Prof. Jeannin revealed a generally high level of activity within the Union and a great deal of voluntary hard work by a large number of chemists serving on its commissions and committees. Some commissions, however, had too many programmes in

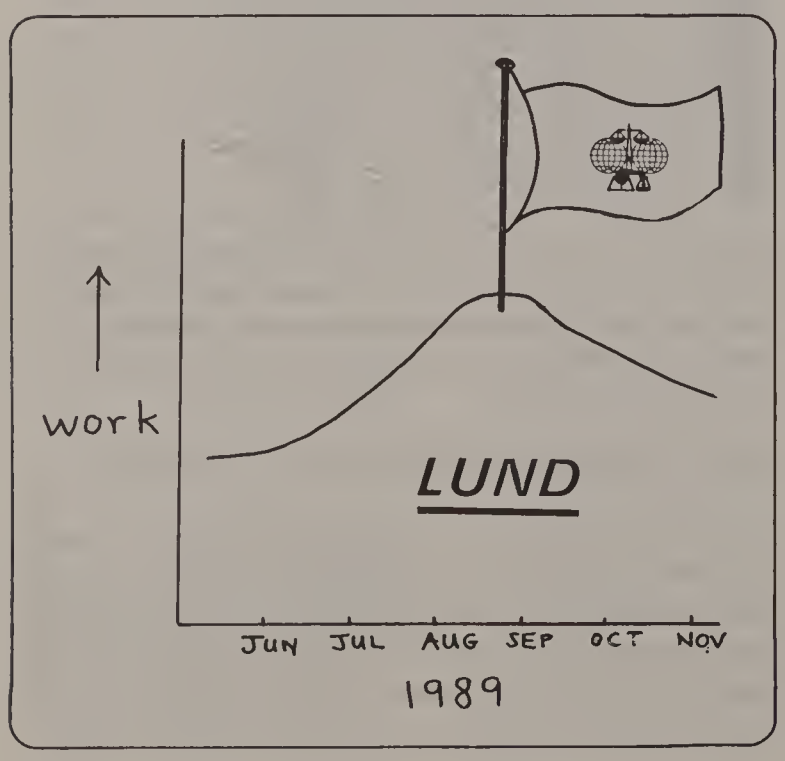
their schedule, thereby diluting their effectiveness. In a few cases, there were programmes still unfinished after 10 years.

During the period of restructuring the Vice-President suggested that no new (full) commissions should be formed, though Limited Life Time Commissions (LLTCs) might be set up to undertake specific activities for a definite period of time.

Subsequently, acting on this recommendation, Council approved the formation of an LLTC on "Isotope specific measurements as references for toxic/bioessential element assays" jointly between Divisions II and VII as part of the "Chemistry and the environment" activity; and LLTC on "functional polymers" in Division IV with a view towards a possible future mission-oriented activity on "Chemistry and advanced materials"; two LLTCs in Division V, one on "Environmental analytical chemistry" as part of the "Chemistry and the environment" activity and the other on "Chromatography and other analytical separations"; two LLTCs in Division VII on "Instrumentation and software" (in Clinical Chemistry) and on "Biotechnology in clinical chemistry".

Division II was authorized to form an Inter-divisional *ad hoc* Committee on Solid-State Chemistry with representation from Divisions I, II, III, and IV, plus the Committee on Teaching of Chemistry, to undertake a feasibility study on the need for IUPAC activity in this area and to report back to the Bureau by 1991.

Division V dissolved its Commissions on Analytical Reactions, Reagents and separations (V.1) and on Analytical Nomenclature (V.3), and replaced them by a single Commission on General Aspects of Analytical Chemistry (V.1), covering largely the same area as the former two bodies. Otherwise the council authorized the continuation of all existing IUPAC commissions for a further two years.



IUPAC deplores use of chemical weapons

A letter from the Association of Greek Chemists calling for IUPAC, as the international union of chemistry, to seek a ban on chemical weapons, was received sympathetically. However, since it had not been put down as a formal motion in time for discussion by Council, the Executive Committee was requested to look into the matter and, as appropriate, to refer it to ICSU in the broader context of all weapons of mass destruction, such as nuclear and biological as well as chemical.

[*Note*: This column is being written in September, 1989, and the world's politicians have meanwhile turned their attention seriously to the abolition of chemical weapons.]

Further encouragement for affiliate membership scheme

In speaking of the affiliate membership scheme within the Union, the Secretary General had encountered the observation that what was formerly a "scheme" was now *de facto* a "programme". Council noted with approval that the affiliate membership programme (AMP) was now a prominent feature of IUPAC activity. It served to disseminate information to all interested chemists, including younger ones in particular, and those from some 40 additional countries which were not yet members of IUPAC.

Some concern was expressed by the delegates from two countries that their numbers of affiliates were rather small, but the Secretary General commented that at least the Union was now in touch with quite a few chemists, even in such countries, whereas formerly there were none. He agreed with the President's view that it was appropriate now to have a membership drive, and reiterated the President's point that this could only be done successfully through the good offices and planned efforts of the NAOs and NCSs since the Union had no jurisdiction within national borders.

Indeed, IUPAC had originally been most careful to design AMS so that it would in no way come between NCSs and their chemists. He hoped that all NAOs/NCSs would undertake a recruitment drive for the Union in order to help increase the efficiency of dissemination of news of the work of IUPAC and to promote and encourage the participation of their chemists in international chemistry through IUPAC.

Meanwhile, the Council accepted the Bureau recommendation that AMP should continue as an ongoing activity of the Union, that the Bureau should establish a Committee on Affiliate Membership (CAM) from amongst the Bureau members, and that, through CAM, efforts should be made to improve AMP and the facilities for affiliates. The position should be reviewed again by the Council in four years.

Publications success

Reporting on the activities of the Publictions Committee, its Chairman, Dr Edwin Becker (USA), commented that the committee had the responsibility "to advise the President and the Executive Committee on all matters of publication including policy" and that "publications of various sorts represent the main tangible output of all IUPAC activities". Although publications had in recent times become a major source of income for the Union rather than a drain on its resources, the main policy, as reconfirmed by the Executive Committee, remained to maximize dissemination of information rather than to maximize income. The Publications Committee now took this as its central theme.

Publications Committee Chairman Dr Edwin Becker: the main policy of the Union, in respect of publications, is to maximize dissemination of information rather than to maximize income.

During the past three years the Union had published many significant reports, notably two revised compendia — on *Analytical nomenclature* (the Orange Book) and *Quantities, units and symbols in physical chemistry* (the Green Book) — while Part I of a new two-part edition of *Inorganic nomenclature* (the Red Book) was scheduled to appear in the near future.

In a period of generally declining journal sales, Dr Becker was pleased to report that *Pure and Applied Chemistry* (*PAC*), the official repository of IUPAC recommendations and the primary publication medium for major lectures at IUPAC-sponsored symposia, had maintained its position on library shelves despite its small circulation of approximately 1000. In terms of the *Citation Index* it did well, though behind primary research journals and a few secondary (review) journals. Nevertheless, the nature of the contents of *PAC* were being continually assessed by the Publications Committee.

Database activity

The Committee on Chemical Databases is now becoming very active in collaboration with various IUPAC commissions in developing personal computer-compatible databases on stability constants, solubility data, thermodynamic parameters, conductivities and so on. A prototype database, covering IUPAC recommendations on nomenclature and symbols published in *PAC*, was demonstrated during the assembly, and the first PC-compatible database on *Enthalpies of Vaporization of Organic Compounds* will shortly be produced in collaboration with Blackwell Scientific Publications, official publisher to the Union.

IUPAC and chemical industry

COCI reported on its well-advanced plans for the 1st IUPAC Workshop on Safety in Chemical Production (Basel, Switzerland, September, 1990). The workshop will be distributed over several types of chemical plant in the Basel area, and will provide "hands-on" experience in safety procedures, risk assessment, and hazard education. Participation will be limited to about 200 people, many from developing countries, who will be financed from funds which were raised by COCI from chemical industry.

The committee also plans to hold similar workshops in other regions of the world. This activity of COCI is a very significant departure for the Union, and is related to a serious concern of the world community in relation to chemical "disasters".

IUPAC and world needs

The CHEMRAWN Committee goes from strength to strength. The Council heard from Chairman Prof. John Thomas (UK) of the arrangements for CHEMRAWN VII — Chemistry and the Atmosphere: Its Impact on Global Change — to be held in Baltimore (USA) in May, 1991, thus contributing very much to the Union's "Chemistry and the environment" activity.

Plans were under consideration for a second World Conference on Chemistry and World Food Supplies (India, around 1992) and other possible themes were Chemistry in Resolving Ecological Problems of Industry, Transportation and Energy (USSR), Chemistry of Water; Chemistry of Traditional Medicines; and, lastly, Waste as a Raw Material for Industry. Clearly CHEMRAWN was continuing to instigate and launch a very important series of world conferences, thereby demonstrating IUPAC's concern and acceptance of its responsibility for chemistry and the well being of mankind.

IUPAC in 1991

In 1987, at the Boston General Assembly, Council provisionally accepted that the 1991 assembly should be held in Athens and the 1991 congress in Budapest. At Lund, the Council confirmed Budapest as the venue

for the 33rd Congress during 17–22 August 1991.

However, following extensive discussions of the matter by the officers, Executive Committee, and Bureau, it was decided, on the grounds of unforeseen high costs, not to hold the 36th General Assembly in Athens. These high costs were associated with the need to use air-conditioned hotels (first class) for all the meetings and living accommodation in Athens to counteract the anticipated high temperatures in August.

It was agreed, therefore, to accept an invitation kindly presented by the Federal Republic of Germany to hold the 1991 assembly at a venue and time still to be decided, though almost certainly immediately after, or before, the time of the Budapest congress referred to above. As Secretary General, I am well aware of the generosity of FRG in this matter, bearing in mind a previous occasion when at short notice it undertook to host the IUPAC Congress in 1983.

Planned assembly and congress in 1993

The Council considered invitations received for the 1993 IUPAC General Assembly from Chile, Israel, and Portugal, and from Israel and China to host the 1993 IUPAC Congress. After careful consideration of the matter by the Bureau, Council accepted the Bureau's recommendations that, provisionally, the 37th IUPAC General Assembly should be held in Lisbon and the 34th IUPAC Congress in Beijing.

1989 was a good year

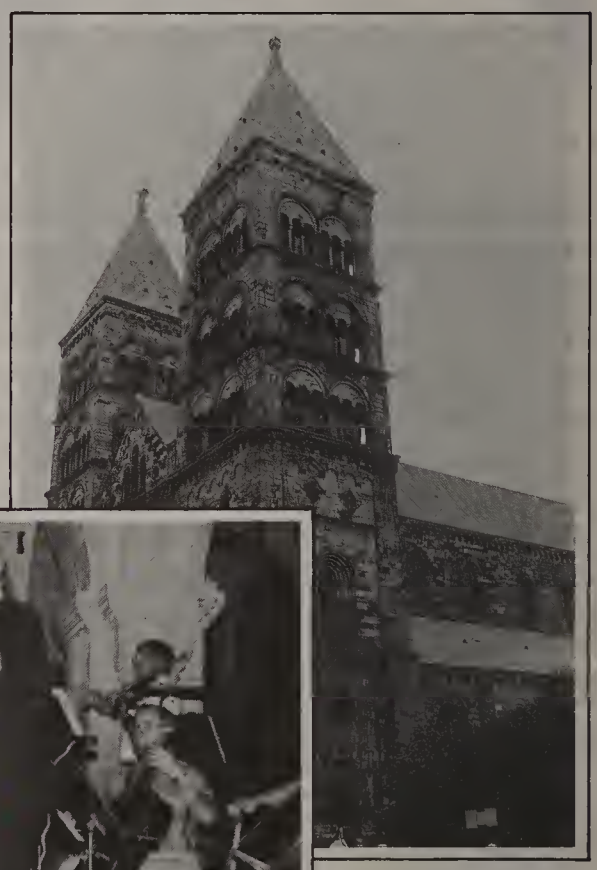
Thanks to the careful planning and attention to detail of our Swedish colleagues, the 1989 IUPAC General Assembly in Lund proceeded very well indeed. Not only was the work of the divisions, commissions, and standing committees greatly facilitated by the efficiency of planning and the services offered, but it also became a pleasurable occasion.

The social events provided were excellent. In particular, a surprise cantata on the work of IUPAC, provided in conjunction with a professional soloist and orchestra at the end of a memorable concert in the crypt of Lund Cathedral by our Swedish-born Treasurer Anders Björkman, was an event that will long be fondly remembered with great pleasure by Bureau/Council members.

It is a pleasure to reiterate the thanks given by Academician Koptyug to the Swedish organizing committee in his presidential address: "For what we received — with great pleasure — we are truly grateful".

Interesting prospects for 1991

As one gets to know IUPAC, it becomes apparent that though, because of its nature, it seems to move slowly, nevertheless, it is a forward-looking organization. Thus, 1991 is likely as a "big election" assembly year, to be lively and interesting. Not only will there, as usual, be the vice-presidential position to fill and also at least four Bureau vacancies, but also a requirement for a completely new Treasurer and Secretary General, since both Prof. Björkman and I will have completed our full span of office. We look forward to substantial progress on "Chemistry and the environment" and the institution of new mission-oriented work on "Chemistry and advanced materials".



Participants (above) enjoyed a memorable concert in Lund Cathedral (above right). The final item was a surprise cantata on the work of IUPAC composed by Treasurer Björkman which he presented together with the orchestra and concert solist (right).

Provisional Recommendations

IUPAC seeks your comments

In this section we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *Pure and Applied Chemistry* and synopses of these published in *CI* as recent reports.

If you would like to comment on the provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the IUPAC Secretariat. The most up-to-date list of national/regional centres appeared in *CI*, Vol. 11, No. 2, p. 67, 1989.

Electrified interfaces in aqueous dispersions of solids; recommendations concerning the nomenclature, symbols, definitions and measurements

The document is devoted to the measurement, interpretation, and reporting of interfacial electrochemical properties of disperse systems, emphasizing aqueous dispersions of inorganic materials.

In such systems, electrical double layers form spontaneously by preferential adsorption of certain ionic species. Unlike the case of polarisable (mercury) electrodes, studied extensively in electrochemistry, the (surface) charge is the primary variable. Determining this surface charge requires an analytical (usually potentiometrical) and an interpretational step, which are both discussed in detail. Distinction is made between the surface charge, the specifically adsorbed charge and the diffuse charge.

Electrokinetic (or zeta-) potentials and electrokinetic charges are additional or alternative double layer characteristics. Usually, electrokinetic and surface charges are different quantities. They can even have different signs. The distinction is discussed.

At a specified composition of the solution, it is possible to obtain a situation where the surface charge is zero. The condition is known as the point of zero charge. Alternatively, there are conditions where the electrokinetic charge is zero, a situation known as the isoelectric point. In the paper, the experimental determination of these two zero points is discussed, followed by an interpretation, involving their differences. Only in the case of absence of specific adsorption are these two quantities identical.

Comments on the documents should be sent by 31 August, 1990 to: Prof. J. Lyklema, Dept of Physical & Colloid Chemistry, Landbouwuniversiteit, Wageningen, The Netherlands.

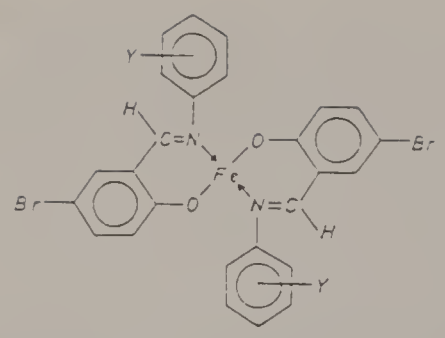
PAC Review

Pure and Applied Chemistry (*PAC*) is IUPAC's official journal. It publishes the main invited lectures of symposia sponsored by the Union; the recommendations of its commissions on nomenclature, symbols and units and technical reports on standardization, recommended procedures, collaborative studies and data compilations. Summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports appearing in *PAC* are published in *CI* in the section *Recent Reports*. In this section we take a brief look at the symposia and lectures published in recent issues of *PAC*.

New iron(II) complexes with bidendate ligands

Juan Costamagna, Luis Araya and Ramón Latorre (Santiago University and Chile University, Santiago, Chile) have synthesized new complexes of iron(II) with bidendate ligands derived from 5-bromo-salicylaldehyde and monosubstituted anilines (see Figure). They have characterized these by chemical analyses and conventional spectroscopic methods.

The Santiago researchers characterized several properties in these complexes in the solid phase:



Iron (II) complexes: Y = 2-Cl; 3-Cl; 4-Cl; 2-CH_3; 3-CH_3; 4-CH_3; or H.

- absence of oxygen bridges;
- anomalously high magnetic moment values at room temperature;
- an antiferromagnetic behaviour at low temperatures;
- a double Mössbauer spectrum with a normal isomer shift value for low spin iron(II) complexes at room temperature;
- presence of hyperfine pattern Mössbauer spectra at 4 K with at least a sextuplet and a doublet having an internal magnetic field of about 460 KOe.

According to Costamagna and his co-workers, these results, together with the simulation curves of magnetic susceptibilities versus temperature, suggest the existence of at least two sites for the iron atom and could tentatively be interpreted assuming the existence of a formal planar geometry around the iron atoms, probably in a triplet state, and ferrimagnetic–antiferromagnetic interactions.

Their paper "Some solid effects in iron(II) complexes with ligands of potential biological interest" was presented as a session lecture at the 26th International Conference on Coordination Chemistry held in Porto, Portugal, 28 August–2 September, 1988. The conference plenary and session lectures were published in the May, 1989 issue of *PAC*.

IUPAC affiliate Thomas Kaden presented a paper on the reactivity of side chain functional groups in macrocyclic Cu^{2+} complexes at the 26th International Conference on Coordination Chemistry in Porto.

Costamagna was one of several IUPAC affiliates who contributed to the Porto conference and whose lectures were published in the May issue of *PAC*. The other affiliates were Gilbert Gordon (see page 5); Thomas Kaden (Switzerland); Robert Feltham (USA) and Rui Fausto (Portugal).

The paper by Kaden and co-workers D. Tschudin, M. Studer and U. Brunner from the Institute of Inorganic Chemistry, Basel was concerned with the reactivity of side chain functional groups in macrocyclic Cu^{2+} complexes. Using three examples, Kaden showed how the metal ion incorporated in the macrocyclic ring modifies the reactivity of functional groups in the side chain.

Feltham, who is from the University of Arizona, described the structure-reactivity relationships of organometallic nitrites and nitrates. His lecture outlined the mechanisms of the reactions of these complexes, especially their oxygen-atom transfer reactions, with respect to their uses as catalysts and intermediate precursors.

The paper by Fausto and co-worker J.J.C. Teixeira-Dias from The University Chemical Department, Coimbra, was concerned with Raman spectroscopy and molecular mechanics in the investigation of molecular structure of calcium, strontium, barium and copper(II) monochloroacetates. The paper showed how molecular mechanics is used to provide information on the stable conformations of the monochloroacetic acid molecule. The Raman spectra of calcium, strontium, barium and copper(II) monochloroacetates in crystalline phases were recorded and interpreted to assess the relative importance of the mutual interactions of the metal–metal and metal–ligand bonds and the nature of the metal–metal bond in these systems.

Thermodynamics of ligand binding to proteins

Biological macromolecules function in a variety of modes. An essential facet is the involvement of binding reactions by regulatory, usually simple, ligands. Substrate binding to enzymes and oxygen binding to respiratory proteins are examples.

Underlying these processes one often finds coupling of auxiliary reactions to the one of primary concern. Such interaction leads to the phenomena of linkage between different (heterotropic) ligands and is of fundamental importance in enabling biological macromolecules to execute control and regulation of complex systems.

Equally significant is the property of cooperativity found in certain multi-subunit biological molecules where the same ligand facilitates binding of another of the same kind. This is known as homotropic effect. Underlying often deceptively simple ligand binding reactions, one sometimes finds the macromolecule

changing its conformational and aggregational state. The exploration and characterization of these events is greatly facilitated by the methods of classical and statistical thermodynamics.

IUPAC affiliate Stanley Gill (University of Colorado, USA) lectured on the thermodynamics of ligand binding to proteins at the 10th International Conference on Chemical Thermodynamics held in Prague, Czechoslovakia. The plenary, main and Rossini lectures presented at the conference were published in the June 1989 issue of *PAC*.

In his lecture, Gill outlined the description of multiple equilibrium events, that describe typical biological processes, in terms of a general binding partition function. This function, which may incorporate known features of structure and reaction properties of a given system, has a direct connection to measurable properties, such as the amount of ligand binding and the enthalpy change of ligand binding. The application of suitable binding partition functions to results obtained for oxygen and carbon monoxide binding to hemoglobin and hemocyanins allows description of the binding potential in terms of the chemical potentials of these ligands. From the binding potential one obtains by differentiation the full description of binding, linkage, and cooperativity that a given macromolecular system exhibits.

Calorimetry today

Wojciech Zielenkiewicz, an IUPAC affiliate at the Institute of Physical Chemistry of the Polish Academy of Sciences, Warsaw presented a lecture entitled "Calorimetry today" at the Prague conference on chemical thermodynamics. His lecture was one of the

Wojciech Zielenkiewicz is one of 118 IUPAC affiliates in Poland. He lectured on calorimetry at the 10th International Conference on Chemical Thermodynamics held in Prague.

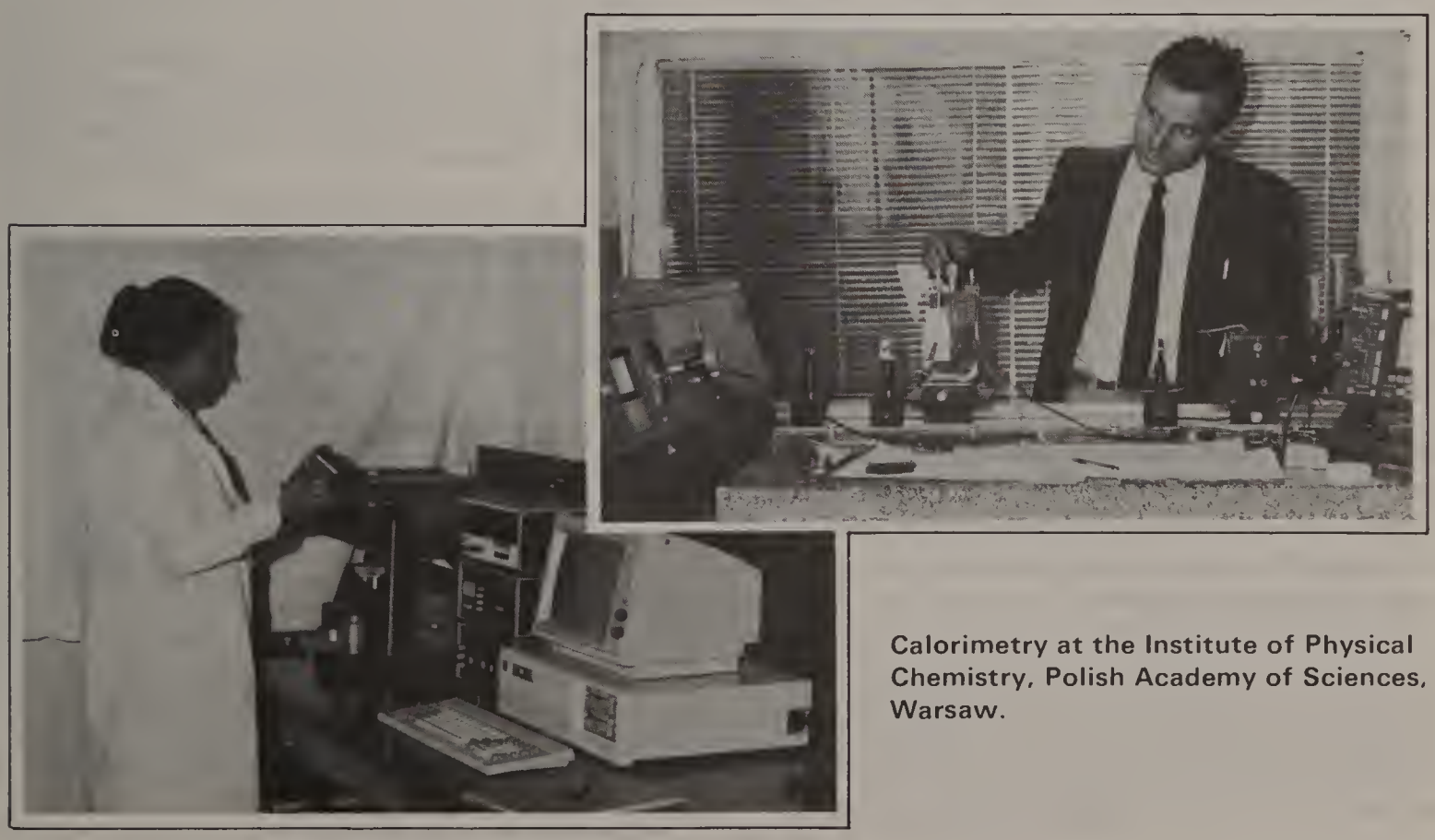
"Swietoslawski lectures" commemorating the twentieth anniversary of the death of this famous scientist who was named "the father of thermochemistry in IUPAC".

In his lecture, Zielenkiewicz pointed out that the first adiabatic–isothermal calorimeter was described 205 years ago, by Lavoisier and Laplace, in the famous work "Memoire sur la chaleur".

At present, automatic electronic devices have created a great number of possibilities for the realization of isothermal conditions for measurements in isothermal–adiabatic as well as in isothermal–non-adiabatic calorimeters. Three ways of realization of the compensation method by means of respective electronic systems can be distinguished:

- via the application of impulse compensation,
- by proportional compensation,
- by proportional-integrating compensation.

Interesting developments are now taking place with this group of devices. Several open calorimetric



Calorimetry at the Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw.

systems which can be used at elevated pressures and temperatures have been constructed. These calorimetric systems are used, for example, in the determination of the heat of mixing over the whole concentration range at pressures up to 60 MPa.

Carbohydrates in Stockholm

The July, 1989 issue of *PAC* contains the plenary lectures presented at the 14th International Carbohydrate Symposium held in Stockholm, Sweden, August, 1988.

They include a paper by David C. Myles and IUPAC affiliate Samuel J. Danishefsky (both from Yale University, USA) entitled "The synthesis of polyoxygenated natural products via fully synthetic branched pyranose derivatives: application to the erythronolide problem". They reported that reiterative cyclocondensation reactions and highly stereoselective functionalization reactions have been coordinated to reach a derivatized version of the seco acid of 6-deoxyerythronolide.

The Whistler award lecture was presented by David R. Bundle (National Research Council of Canada, Ottawa). It was entitled "Antibody combining sites and oligosaccharide determinants studied by competitive binding, sequencing and X-ray crystallography".

Other papers included in this issue of *PAC* are: "Computational methods for studying oligo- and polysaccharide conformations" (Igor Tvaroska, Institute of Chemistry, Center of Chemical Research of the Slovak Academy of Sciences, Bratislava, Czechoslovakia); "Recent developments in the synthesis of glycoconjugates" (Richard R. Schmidt, Universität Konstanz, FRG); "Recent progress in the application of plant lectins to glycoprotein chemistry" (Toshiaki Osawa, University of Tokyo Bunkyo-ku, Japan); "Carbohydrates and the pharmaceutical industry" (Jörgan Lönngren, Uppsala, Sweden); and "Industrial polysaccharides" (Iain C. M. Dea, Leatherhead, UK).

Stockholm: venue of the 14th International Carbohydrate Symposium.

Recent Reports

In this section we publish summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports. The full texts of these recommendations and reports are published in *PAC*.

Precipitation of major constituents for trace preconcentration: potential and problems

The success of the separation of trace components by precipitation of the matrix depends not only on the quantitatively definable properties of the matrix and the trace constituents, but also on many marginal conditions. These produce effects which impede the development of general rules for the choice of appropriate working parameters.

In this report an attempt is made to derive simple rules for trace enrichment. The application of the rules is illustrated with examples from the literature. A compilation of publications is tabulated dealing with the application of matrix precipitation to the simultaneous separation of several elements from pure metals.

This report was prepared for publication by Alan Townshend and Ewal Jackwerth, Commission on Microchemical Techniques and Trace Analysis (V.2), Analytical Chemistry Division, and published in PAC, *Vol. 61, No. 9, pp. 1643–1656, 1989.*

Nomenclature for automated and mechanised analysis (Recommendations 1989)

In 1970 the Commission on Analytical Nomenclature of the Analytical Chemistry Division produced the document "Recommended Nomenclature for Automatic Analysis" (*PAC*, Vol. 21, pp. 527–531).

In 1978 the Commission on Automation and Clinical Chemical Techniques of the Clinical Chemistry Division, produced the document "Characteristics and Attributes of Instruments intended for Automated Analysis in Clinical Chemistry" (*IUPAC Inf. Bull.*, No. 3, pp. 233–240, 1978). This document contained a glossary.

Subsequently it was jointly decided by the two commissions to produce a document to supersede the two previous documents. The aim has been to provide a single document containing terms currently used for automated and mechanized analysis in analytical and clinical chemistry with definitions relevant to their particular use in those areas. Most definitions were taken from the above documents or other appropriate sources, others were elaborated by the two commissions.

The Expert Panel on Instrumentation of the International Federation of Clinical Chemistry is especially acknowledged for its critical review of draft versions of the present document.

This report was prepared for publication by G. G. Guilbault and M. Hjelm, Commission on Analytical Nomenclature (V.3) — Analytical Chemistry Division, Commission on Automation and Clinical Chemical Techniques (VII.1) — Clinical Chemistry Division, in collaboration with Subcommittee on Analytical Systems — International Federation of Clinical Chemistry, and published in PAC, *Vol. 61, No. 9, pp. 1657–1664, 1989.*

The above synopsis of the report was published as Provisional Recommendations in CI, *Vol. 6, No. 4, p. 37, 1985. The Provisional Recommendations were sent to national/regional centres for distribution to interested chemists. Comments on the recommendations received before the end of March, 1986 were taken into consideration when preparing the final report.*

Nomenclature of steroids (Recommendations 1989)

The recommendations of steroid nomenclature have a long history, a brief account of which was given in definitive rules for the nomenclature of steroids (1971). Since that time, many of the principals developed for the nomenclature of steroids have been generally adopted and have become part of the IUPAC nomenclature of organic compounds, especially section F. The aim of the present document, prepared with the help of a panel of experts, is a revision of the recommendations in the light of new developments and current practice.

The main changes are as follows: (i) modifications, where appropriate, to conform to section F (Natural Products) of the IUPAC nomenclature; (ii) a wider use of the *R,S* system for designating the stereochemistry in the side chain; (iii) the incorporation of the new recommendations (1981) for the nomenclature of vitamin D; and (iv) the omission of most steroid alkaloid and steroid-like triterpenoids as it is intended that they should be treated in an appendix to IUPAC nomenclature, section F. Significant changes are indicated by ▲ in the margin for major additions and △ for minor revisions.

These recommendations are numbered 3S-1, 3S-2, 3S-3, etc., the initial three denoting that this is the third revised set of recommendations.

This report was prepared for publication by G. P. Moss, Joint Commission on Biochemical Nomenclature — IUPAC and International Union of Biochemistry, and published in PAC, *Vol. 61, No. 10, pp. 1783–1822, 1989.*

A synopsis of the report was published as Provisional Recommendations in CI, *Vol. 9, No. 5, p. 180, 1987. The Provisional Recommendations were sent to national/regional centres for distribution to interested chemists. Comments on the recommendations received before the end of January, 1988 were taken into consideration when preparing the final report.*

Recommended methods for the purification of solvents and tests for impurities: benzene and toluene

A table of the relevant physicochemical properties of benzene and toluene are presented and the most important solvent properties of both solvents for chemical and electrochemical analysis are discussed. Examples of electrochemical analysis in benzene and toluene are given. The most common impurities found in commercial benzene and toluene are listed and recommended purification procedures are presented.

This report was prepared for publication by Karl M. Kadish, Xihai Mu and James E. Anderson, Commission on Electroanalytical Chemistry (V.5), Analytical Chemistry Division, and published in PAC, *Vol. 61, No. 10, pp. 1823–1828, 1989.*

High Temperature Materials Chemistry

The 6th International Conference on High Temperatures — Chemistry of Inorganic Materials took place at the National Institute of Standards and Technology (formerly National Bureau of Standards), Gaithersburg, Maryland, USA in April, 1989.

Introduction

This conference was the sixth in a triennial series of IUPAC-sponsored conferences initiated by the Commission on High Temperature and Solid State Chemistry (II.3). The purpose of the conference was to review international progress in the pure and applied chemistry aspects of materials at high temperatures.

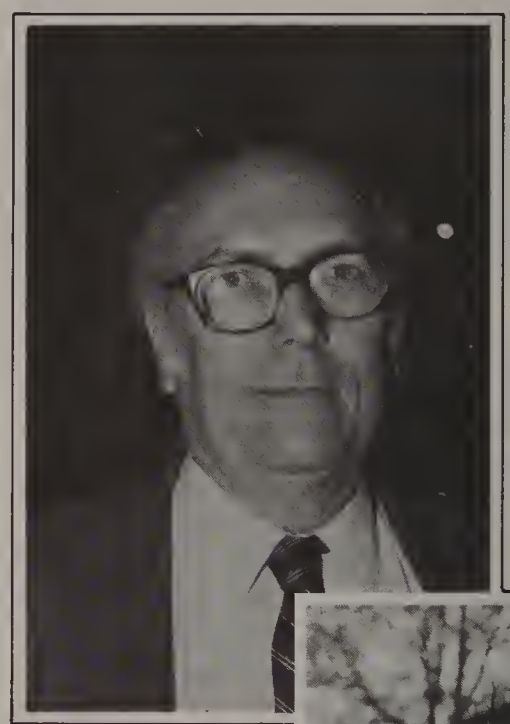
John Hastie (NIST, USA), a titular member of Commission II.3, was chairman of the local organizing committee of the Gaithersburg conference.

Particular emphasis was given to fundamental chemical transformations between the gaseous (molecular or cluster) and bulk states of inorganic materials at high temperatures. Materials considered included individual substances (elements and compounds), as well as advanced ceramics, alloys, composites, and electronic materials.

Advances in measurement techniques

The first session, on advances in measurement techniques, consisted of lectures and posters on the following topics: spectroscopic probes; diffractometry; and physico-chemical methods.

In this session, Gerd Rosenblatt (Lawrence Berkeley Laboratory, University of California, USA) presented a paper, co-authored by D. K. Veirs, on "Recent developments using imaging detectors for Raman characterization of high-temperature materials". Rosenblatt, an associate member of Commission II. 3, pointed out that recent technological advances in light detectors have had a major impact on the characterization of materials by Raman spectroscopy. Imaging photomultiplier-tube detectors are now available that impart position information in two dimensions while retaining photon-counting sensitivity, effectively greatly reducing noise. The combination of sensitivity and reduced noise allows smaller amounts of material to be analysed.



IUPAC affiliate contributors: Malcolm Chase (left) and Karl Spear (below).

The ability to observe small amounts of material when coupled with position information makes possible Raman characterization in which many spatial elements are analysed simultaneously. This capability has been used, for instance, to map phase transformations accompanying crack propagation in partially stabilized zirconia and to analyse the phases present in advance carbon films.

Thermochemistry and models

The session on thermochemistry and models was concerned with the following topics: databases and phase equilibria models; phase equilibria — experimental and applications; and basic data determinations.

IUPAC affiliate Malcolm Chase, from NIST, presented a paper, co-authored with R. D. Levin, on "Thermodynamic properties of the alkaline earth hydroxides". In the light of a considerable amount of new experimental and theoretical data, the thermodynamic properties of the alkaline earth hydroxides MOH[g] and $M(OH)_2$[cr,l,g] have been re-evaluated. This new information was compared with that used in the older evaluations so as to emphasize not only the source of the changes in the thermodynamic functions, but also the magnitude of the changes. Chase presented recommended thermochemical tables for the hydroxide species and also gave information concerning the deuterated species, MOD[g].

In the same session, Lev Gurvich (Institute of High Temperatures of the USSR Academy of Sciences, Moscow, USSR) presented a lecture on "Reference books and databases on the thermodynamic properties of inorganic substances". Gurvich, also an associate member of Commission II.3, listed several requirements which such data must satisfy.

Paul Gilles (University of Kansas, USA), who is a member of the Inorganic Chemistry Division Committee, delivered a lecture on "The high temperature vaporization and thermodynamics of the Magneli phases of the titanium–oxygen system". Gilles said that the binary titanium–oxygen system is noteworthy because of its many crystalline phases. The purpose of this project was to measure the high-temperature thermodynamic properties of the Magneli phases, and thus to complete the high-temperature studies on this chemical system. The paper was co-authored by G. F. Kessinger.

Lev Gurvich.

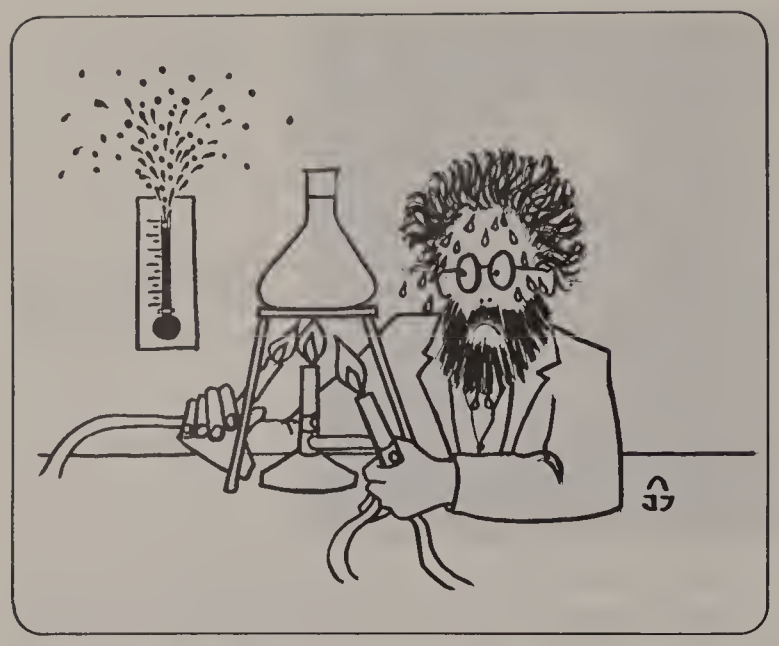
Jean Drowart (Free University, Brussels, Belgium) was official IUPAC representative at the conference. His paper in this session was entitled "Mass spectrometric investigation of systems far from thermodynamic equilibrium using the Knudsen effusion method". Co-authors of the paper were A. V. Gucht and S. Smoes. Drowart also presented an address on "7000 years of high-temperature materials chemistry" at one of the conference social events.

Processing and synthesis

The third session of the Gaithersburg conference was devoted to processing and synthesis. The topics were: clusters as reaction intermediates and model structures; nucleation and growth of small particles; and processing — mainly from the vapour phase.

Lectures included one on "The role of high-temperature chemistry in CVD processing" by IUPAC affiliate Karl Spear (Pennsylvania State University, USA). Chemical vapour deposition has become an indispensible tool for producing a broad range of materials of both scientific and commercial interest.

Paul Gilles (left) enjoys a joke at the opening of the conference. Official IUPAC representative Jean Drowart (right) presents a lecture on 700 years of high-temperature materials chemistry.



The commercial applications range includes coatings produced on solid parts for protection against abrasion and/or corrosion, coatings of fibres to modify interface reactions in composite materials, and thin film coatings integral to microelectronic and optical devices. The continual increases in performance required of these materials must be accompanied by an increasing fundamental understanding of processes which lead to the deposition of these coatings and thin films.

The first four sessions included poster contributions. On the right Madeleine Sampson (Rice University, USA) checks her poster on mass spectrometric studies of the vaporization behaviour of $SrZrO_3$, $SrHfO_3$, yttria stabilized hafnia, and $Ir_{0.4}Al_{0.6}$. On the left is Marcelle Gaune-Escard (University de Provence, France) who displayed a poster on "Thermodynamic modelling of high-temperature melts and phase diagram calculations".

Spear's paper addressed the vital role that high-temperature chemistry, can and does, play in developing an understanding of CVD processes. This understanding serves to explain experimental observations and to reliably predict the CVD behaviour under unstudied experimental conditions.

Also in session 3, Inorganic Chemistry Division Vice-President Kurt Komarek (Institute of Inorganic Chemistry, Vienna, Austria) presented a paper, co-authored by H. Blaha, on "The reduction of silica with graphite". Komarek reported on investigations into the reduction of silica with excess graphite with a thermobalance in vacuum between 1668 and 2023 K. They varied the molar ratio of SiO_2 to C between 1:5 and 1:50. Both quartz powder and fibres, compacted and uncompacted, were used.

Session 4 was concerned with performance under extreme environments and covered the following two topics; hot corrosion; and high-power laser-materials interactions.

During the conference, participants had an afternoon free to visit the Smithsonian Air and Space Museum and downtown Washington, DC.

The father of high temperature chemistry

The final session, chaired by Paul Gilles, was entitled "Conference wrap-up". The session included a conference overview with a personal perspective on the role of chemistry in high-temperature materials science and technology by Leo Brewer.

Brewer is known by high-temperature chemists as the father of this branch of chemistry. He discovered "Brewer's Rule" which relates to the variation of relative pressures with temperature and was a proponent of the "Brewer–Engel Theory" which concerns the acid-based interactions in the formation of intermetallics.

Born in 1919, he graduated from the California Institute of Technology and earned his PhD in chemistry at the University of California in 1942. He immediately joined the Manhattan Project where he led a group that compiled thermodynamic data, fabricated sulfide

Participants listen intently to Lev Brewer (left) during the conference wrap-up session.

crucibles and carried out fundamental research in high-temperature syntheses and properties of materials. He soon joined the faculty of the University of California where he has since remained.

He is a member of the National Academy of Sciences and was the first director of the Inorganic Materials Research Division at the Lawrence Berkeley Laboratory. He was a secretary of Commission II.3 and editor of the *Bibliographic reference book on high temperature chemistry*.

Quality Assurance

The 3rd International Symposium on the Harmonization of Quality Assurance Systems in Chemical Analysis was held at the National Academy of Sciences, Washington, DC, USA in April, 1989. Lewis Coles reports.

Participants at the 3rd International Symposium on the Harmonization of Quality Assurance Systems in Chemical Analysis.

The symposium was preceded by a workshop, the objective of which was to develop a protocol acceptable by industrial, national and international organizations for the adoption and presentation of reliability characteristics of methods standardized by collaborative study.

The long-term objective of the symposium was to draft a protocol for the development and presentation of quality assurance procedures. The first symposium[1] in Helsinki showed that there was a need to develop international guidelines for collaborative analytical studies and the second symposium[2] in Washington, identified the design essential for validation of the performance of analytical methods and pointed the way towards harmonization.

Four sessions

Forty-two participants attended the symposium and 17 speakers made presentations during four sessions,

each being followed by a discussion period.

The first session, chaired by Analytical Chemistry Division Vice-President Gerrit Den Boef, began with an outline of the principles of quality assurance by John Taylor (USA) showing how chemical data play an increasingly important role in decision making and that reliability of the data is essential in reaching the correct conclusion. A laboratory should operate under its own general on-going programme while data should be produced under a specially developed programme designed to assure that their quality is sufficient for a specific purpose.

Gerrit Den Boef who became President of the Analytical Chemistry Division at the IUPAC General Assembly in Lund.

Mary Ann Godshall (New Orleans, USA) provided an interesting perspective on quality assurance in the sugar industry emphasizing the international character of the trade in sugar and complaining that many of the programmes were initiated by individual companies only. She reviewed the quality assurance programmes of the International Commission for Uniform Methods of Sugar Analysis (ICUMSA).

Clinical Chemistry Division President Stan Brown chaired the second session. Robert Herber (Coronel Laboratory for Occupational and Environmental Health, Amsterdam, Netherlands) described a quality assurance system design for the determination of lead and cadmium, B2 microglobulin, retinol binding protein and albumin in urine. The system comprises the use of reference materials and determination protocols, as well as the set up of reference laboratories and assistance of experts, including training courses. Intercomparison programmes are used as test steps and adequate simple statistics are used for these programmes. This programme is used in a World Health Organization study on early effects of cadmium in the elderly population.

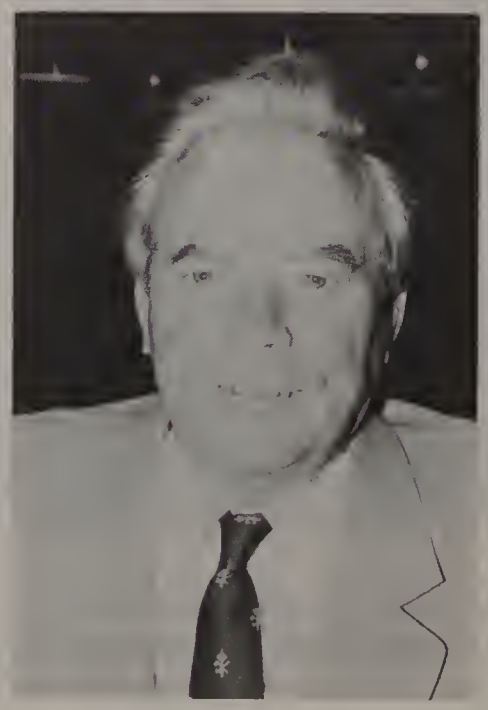
John Locke (President, American Association for Laboratory Accreditation) continued by generalizing about accreditation, quality assurance and control in the chemical laboratory. Statistical measurement control, in conjunction with the implementation of formal quality systems in the laboratory produces significant improvements in the quality of testing data needed to support production and service operations.

The third session, chaired by Lewis Coles, started with Edward Shilling (Rochester Institute of Technology, New York, USA). He spoke of the need for harmonization of quality assurance systems in all technical disciplines and emphasized that analytical procedures are only a part of the total quality system for any operation. As such, procedures which have been developed for the organization can be applied to develop a protocol for the analytical aspect as well.

500 million dollars a year

Stanley Blacker (Director, US Environmental Quality Assurance Programme) indicated that the provision of data operations consumes about USD 500 million a year and there is a need to provide the right type and quality of data, the first time. Otherwise, the extensive regulatory means of protecting public health and ecological systems cannot operate effectively. Recently, the quality control programme was restructured in order to involve management and plan quality, and already significant improvements have been made.

The last session (chaired by Bill Horwitz) began with Michael O'Donovan (Pfizer Chemical Corporation) emphasizing the importance of the quality manual. All laboratories use people, materials, equipment and documentation to some degree, depending on the nature of the work being carried out. The fundamental requirement for all of them is to produce good-quality information, through well-documented standard operating procedures. Traditionally, good-quality data have been produced by highly motivated individuals using well-developed techniques to achieve a desired goal. In the industry of contract



Author Lewis Coles chaired the third session. He is a member of the *CI* Editorial Advisory Board and became President of the Applied Chemistry Division at Lund.

Bill Horwitz.

analytical laboratories, where hundreds of samples must be analysed and reported on each week, total reliance on high-calibre individuals is not sufficient and will not ensure that good-quality data are produced. The volume of work to be processed makes it impractical, subject to error and inconsistency. In this environment a quality assurance programme implemented through a well-organized quality manual is a prerequisite for the production of reliable data.

Michael Thompson (Birkbeck College, London, UK) spoke on analytical data quality control in theory and practice. It is not until the laboratory staff are certain that statistical control prevails that steps can be taken to estimate bias and precision. The most useful breakdown of these items is perhaps into "within-batch precision", "batch bias" and "overall bias". Each of these concepts can be estimated and used both for control purposes (that is, acceptance of data as appropriate) and for diagnostics, the identification and elimination of problems. Perhaps the most difficult aspect is the definition of standards for bias and precision. The correct approach seems to be standards based on the use to which the data are to be put, rather than on standards derived from inter-laboratory trials.

Finally, David Firestone (Centre for Food Safety and Applied Nutrition) described the American Oil Chemist's Society (AOCS) Smalley Check Sample Program as the principal programme of the society in which more than 450 chemists participate annually to check their proficiency and the proficiency of their laboratories in analytical methods used routinely throughout the fats and oils industry. Some 23 series of samples of various commodities, including oilseeds, oilseed meals, oils and related products are prepared and distributed. The check sample programme is currently used to carry out special inter-laboratory studies and to compile precision data for standard AOCS methods used in the analysis of various Smalley Check samples.

Conclusion

The Working Party concluded that the presentations at the symposium did not show enough coherence of ideas and principles for drafting a protocol. Following the example of the 1st Harmonization Symposium[1] in Helsinki, it was decided to organize another symposium, where the participants will be asked to observe certain guidelines when drafting their lectures and comments.

Accordingly, the 4th Harmonization Symposium has been arranged for 2–3 May, 1991 in Geneva, Switzerland.

References

1. Egan, H. and West, T. S. 1982. *Collaborative analytical in chemical analysis*, Pergamon Press, Oxford, UK.
2. Egan, H. *et al.* 1986. Method validation: The harmonization of collaborative analytical studies. *J. Assoc. Off. Anal. Chem.*, **69**, No. 3, pp. 392–436.

Harmonization Workshop

At the conclusion of the last meeting of the IUPAC Interdivisional Working Party for the Harmonization of Quality Assurance Schemes for Analytical Laboratories, held in Boston, USA, August, 1987, a new project was initiated. The objectives were to develop protocols which would be acceptable to industrial, national and international organizations for: (1) the adoption of methods standardized by collaborative study; and (2) the presentation of performance characteristics in the texts of those methods.

Need for harmonized protocols

The need for developing these protocols arises because methods with unsatisfactory performance characteristics have in certain cases been adopted for publication as standard methods. In addition, precision clauses in standard methods have often been presented in formats which, although statistically sound, are of little practical value to the user of the standard. Furthermore, other performance characteristics of methods, for example accuracy (trueness), limit of detection and so on, have generally not been indicated in the texts of the standardized methods.

It was agreed that a questionnaire would be drafted and then circulated to the organizations which took part in the international project for the harmonization of collaborative analytical studies. The questionnaire, circulated in February, 1988, invited specific comments on:

- the criteria to be used for determining if a method, the performance characteristics of which had been determined by collaborative study, warranted publication as a standard, and

- the presentation of precision data (and other performance characteristics) in the texts of standardized methods.

A discussion document based on the comments received in response to the questionnaire was prepared and circulated during January 1989. This discussion document outlined recommendations for both the adoption procedure and the presentation of the performance characteristics of standardized analytical methods. These recommendations were discussed by 34 delegates at a two-day workshop held in Washington DC, USA, 17–18 April 1989 under the chairmanship of W. Dennis Pocklington.

Workshop discussions

The workshop aimed to draft internationally agreed protocols which, if followed by standards organizations, would ensure that all methods published as standard methods had been shown to meet specified minimum requirements as to their performance characteristics. Also, the texts of methods published as standard methods would incorporate information regarding the precision and other performance characteristics of the methods, in a form which was of direct practical value to the user of the methods.

Each of the seven recommendations outlined in the discussion document were then considered. The first recommendation, which was concerned with adoption criteria for methods standardized by collaborative study, generated considerable discussion. It was evident that differing views were held as to the practicality of equating maximum reproducibility relative standard deviation values to analyte concentration levels, and also regarding the proportion of statistical outlying collaborative study results which could be tolerated if the method was to be standardized.

The discussion then moved to the remaining recommendations which were mainly concerned with the presentation of performance characteristics in the text of standard methods.

Conclusions

The unanimous conclusions of the workshop were that the text of a standard method should not make the obtaining of duplicate tests results mandatory (as may be prescribed in a "number of determinations" clause), nor should it contain detailed statistical data which are of no immediate practical value to the analyst using the standard. It was recognized that standard methods were used for different purposes, for example in quality control where single determinations may be sufficient, or in the case of arbitration when at least two determinations would be called for.

It was accordingly recommended that information on analytical quality control, which is essential for the satisfactory performance of standardized methods, should be presented in distinct parts and separated from the text of the methods, in the form of both general principles and specific applications.

It should be appreciated that these recommendations represent a significant departure from the policy which has generally been adopted by standard-making bodies, under which precision clauses, and other statistical data, have been drafted as an integral part of the standard method.

Subsequent to the April, 1989 workshop, a document outlining the draft harmonized protocols was prepared and circulated for comment in May, 1989. Comments received following this circulation underlined the differences of views expressed at the workshop regarding, in particular, the adoption criteria. A revised draft of the protocols was prepared taking into account comments received and this revision was considered at the meeting in August, 1989 at Lund at the Interdivisional Working Party on the Harmonization of Quality Assurance Schemes for Analytical Laboratories. Certain minor amendments to the protocols were agreed and the amended protocols are to be submitted for publication in *PAC*.

Washington DC: venue of the Workshop for the Harmonization of Protocols for the Adoption of Standardized Analytical Methods and for the Presentation of their Performance Characteristics.

Conferences

Characterization of porous solids

Alicante, Spain
6–9 May 1990

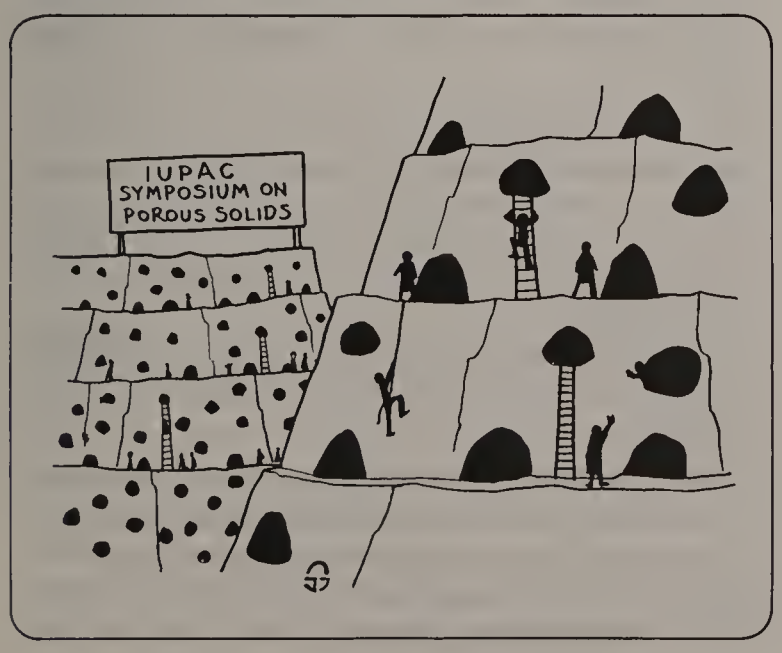
IUPAC SPONSORED

Substantial progress has been made in the development of new porous materials since the first IUPAC Symposium on Characterization of Porous Solids (COPS I) which was held in 1987 (*Studies in surface science and catalysis*, Vol. 39, Elsevier, 1988).

The aim of COPS II is to assess the progress made in both theoretical and applied aspects of this important field. A preliminary report of the IUPAC Commission on Colloid and Surface Chemistry including Catalysis (I.6) on the characterization of porous solids will be presented and discussed during the symposium.

The scientific programme of COPS II will cover the following areas:

- Modelling of pore structures
- Theories of pore filling — including network effects, hysteresis and percolation theory
- Experimental techniques for adsorption, porosimetry, optical and electron microscopy, particle and radiation scattering, calorimetry, fluid permeation, etc
- High-resolution and automated procedures
- Model pore structures: zeolites, carbons, clays, oxides, etc
- Pore systems of technological importance: advanced ceramics, composites, adsorbents, catalysts, membranes, etc



The language of the symposium will be English. The bound symposium preprints containing all extended abstracts will be available at the beginning of the symposium.

The symposium will be held at the Hotel Melia, Alicante. Communications to Alicante by air, road and rail are excellent. There is an international airport with daily connections to the principal European cities and with a frequent service from Madrid and Barcelona airports. There is also a rapid and frequent rail service from Madrid.

Carotenoids

Kyoto, Japan
20–25 May 1990

IUPAC SPONSORED

Chemists and biochemists have clarified the chemical structures, characteristics, biosynthesis, and metabolism of carotenoids, and many of these compounds have now been synthesized and assayed for clinical use. Recently, the biological functions of carotenoids have been studied, and such investigations are important for providing a clear understanding of the roles of carotenoids in nature.

The 9th International Symposium on Carotenoids will be interdisciplinary, and will serve to promote cooperation between research workers with different scientific backgrounds. It will be held from Sunday 20 May to Friday 25 May at the Mt Hiei Hotel, Hieizan, Kyoto. Accommodation will be provided for participants at nearby hotels.

Invited speakers will cover different aspects of the physics, chemistry, biochemistry, functions and applications of carotenoids. The subject categories are:

1. *Structure and stereochemistry*: new carotenoids; carotenoproteins; absolute configuration.
2. *Function and role*: photosynthesis; photoprotection, dynamic aspects.
3. *Chemical synthesis*: new reactions; stereospecific methods.
4. *Analysis*: new methods: physico-chemical methods.
5. *Biosynthesis*: enzymology and genetics; effects of inhibitors.
6. *Metabolism and nutrition*: distribution in foods and diets; enzymology; tracer experiments.

7. *Medical application*: cancer; photosensitivity; anti-oxidant activity.
8. *Biotechnology and commercial aspects*: synthetic sources; natural sources.

Plenary and invited lectures will be published in *PAC*.

Polymer networks
Jerusalem, Israel
21–25 May 1990

IUPAC SPONSORED

The 10th International Symposium on Polymer Networks will be held in Mitzpe Rachel on the outskirts of Jerusalem. The meeting will consist of approximately 30 invited and contributed lectures. Two poster sessions have been scheduled in addition. One half day has been set aside for a visit to some tourist attractions in Jerusalem.

The following topics will be at the focus of the meeting: sol–gel transitions and network formation, spectroscopic and scattering techniques, network membranes, polymer diffusion, static and dynamic properties of covalent networks, inter-penetrating networks.

The invited speakers are: M. Adam (Saclay, France); J. Bastide (Strasbourg, France); F. Brochard (Paris, France); J. des Cloizeaux (Saclay, France); J. E. Martin (Sandia, USA); R. W. Richards (Glasgow, UK); E. T. Samulski (North Carolina, USA); C. A. Smolders (Twente, Netherlands); E. L. Thomas (MIT, USA); M. V. Tirrell (Minnesota, USA); H. H. Winter (Massachusetts, USA).

The language of the conference is English. Access to the conference location is available by public transport from the Ben Gurion International Airport near Tel Aviv. The conference centre is located in the Mitzpe Rachel kibbutz hotel overlooking Jerusalem and Bethlehem. The hotel offers first class conference and recreational facilities. Downtown Jerusalem is only 20 minutes away by public bus which runs on a frequent schedule.

The conference fees are (for IUPAC members/non-members): for delegates in a double room USD 450/470; delegates in a single room USD 545/565; accompanying persons USD 350. Fees include registration, conference material, cocktail reception, half-day tour, conference dinner, and five nights half board (breakfast and dinner) in the conference hotel.

The conference location is a short distance away from the various historical, religious and artistic attractions of the old and new sectors of Jerusalem. Many half or full-day trips are available to nearby sites such as Bethlehem, Herodion, Jericho, Massada, and to the Dead Sea. Post-conference tours are offered to conference participants.

The weather in Jerusalem during the last part of May is usually pleasant with warm clear sunny days and pleasant evenings although occasional hot spells are possible. The average mid-day temperature is 25°C (40% humidity) during the day and 18°C at night.

Trace elements in health and disease
Espoo, Finland
5–8 June 1990

IUPAC SPONSORED

The International Symposium on Trace Elements in Health and Disease will be held in the Hanasaari Cultural Centre, Espoo, Finland — about 7 km from Helsinki. It will be the 3rd Meeting of the Nordic Trace Element Society and the 4th Meeting in the COMTOX series.

The purpose of the symposium is to gather together those who are interested in analytical, metabolic or toxicological aspects of trace elements research. The main objective is to review the present state of knowledge on the relationship between trace elements and human health and disease. Special attention will be given to low trace element intakes in the context of human morbidity, and to the roles in human health of trace elements and other micronutrients having anti-oxidant properties.

The scientific programme will consist of plenary lectures, invited lectures, contributed papers, poster presentations and round-table discussions. The following are the themes and plenary lectures:

1. *Analytical methods and quality assurance*
- Advances in the detection of trace elements in biological fluids and tissues (J. Savory, USA)
- Quality assurance: achievements, problems and prospects (S. S. Brown, UK)

2. *Assessment of intake and exposure*
- Constraints in biological monitoring and health surveillance (P. Grandjean, Denmark)
- Assessment of dietary intake (P. Pietinen, Finland)

3. *Dietary requirements and health effects*
- Dietary micronutrients and cardiovascular diseases (J. Huttunen, Finland)
- Micronutrients and human cancer (W. C. Willett, USA)

4. *Toxicological aspects*
- On the carcinogenicity of chromium, cobalt and nickel (A. Aitio, Finland)

5. *Trace elements and other micronutrients in lipid peroxidation*
- Free–radical reactions and lipid peroxidation induced by trace elements (F. W. Sunderman Jr., USA)

The language of the symposium will be English. Simultaneous interpretation will not be provided.

The registration fee will be (before/after 90.04.01) FIM 1100/1300 for active participants and FIM 450/550 for accompanying persons. IUPAC affiliates are

IUPAC affiliate Philippe Grandjean (Odense Universitet, Denmark) will present a plenary lecture on "Constraints in biological monitoring and health surveillance" at the Espoo symposium. Grandjean is currently Chairman of the IUPAC Commission on Toxicology and a member of the International Advisory Board for the symposium.

entitled to a 10% reduction of the registration fee, if this is declared on the registration form. Accommodation will be available in the Hanasaari Cultural Centre Hotel, Hotel Helka and Summer Hotel Academica (student dormitory).

In early June the temperature of southern Finland is generally around +15°C. Occasional showers may occur. The conference social programme includes a city of Espoo reception and a symposium dinner.

Unsteady-state processes in catalysis

Novosibirsk, USSR
5–8 June 1990

IUPAC SPONSORED

An International Conference on Unsteady State Processes in Catalysis (USPC), organized by the Siberian Branch of the USSR Academy of Sciences, Institute of Catalysis, will be held in Novosibirsk in June, 1990.

The performances of catalytic conversion processes, in particular in the gaseous phase, are improved substantially when unsteady-state conditions are enforced. These enforced conditions may take the form of changes in concentration or temperature of gases entering the catalytic converter, or may be from periodically reversing the entrance and exit of reacting gases in the converter.

An additional benefit of unsteady-state processes in catalysis is that preheating of reacting gases is eliminated, thus reducing the size and price of the plant because the heat exchangers required will be of a smaller size; in some operations they may not be required at all. The environmental benefits are quite obvious.

Although the importance of enforced unsteady-state conditions has been realized both by academic scientists and industrialists, a forum is needed for exchange of information. It is for this reason that the USPC conference is being organized. It is hoped that academic scientists, engineers and industrial entrepreneurs will benefit from the meeting.

The figure illustrates an example of the implementation of the unsteady catalytic method in practice. Two reactors for SO_2 oxidation to SO_3 in production of sulfuric acid are compared in the figure. A traditional reactor (on the right) includes adiabatic beds of vanadium catalyst placed in series and intermediate heat exchangers which can be installed inside or outside the reactor.

The reactor, developed at the Institute of Catalysis of the Siberian Division of the USSR Academy of Sciences (Novosibirsk) is shown on the left-hand side of the figure. The reactor is operated at a periodic reversal of the direction of reaction mixture flow.

The USPC conference scientific programme will consist of 16 invited lectures and approximately 60 selected oral contributions, with poster sessions arranged to match the themes of the meeting. These will cover the following main topics:

- Investigation of dynamics of catalytic reactions
- Mathematical modelling and optimization of unsteady state chemical processes in catalytic reactors
- Industrial applications of forced unsteady-state processes

The invited lectures are: Oscillating rates of CO-oxidation at single crystal planes: a survey of recent mechanistic studies (J. H. Block — FRG); Remote control mechanics: general phenomena, possible consequences in unsteady operations (B. Delmon — Belgium); Modelling of the reversed flow operation of catalytic reactions (G. F. Froment — Belgium); Transient experiments for kinetic analysis of complex heterogeneous catalytic reactions (H. Hofman — FRG); Unsteady catalyst states in fluidized bed reactors (A. A. Ivanov and B. S. Balzhinimaev — USSR); Heat waves in the catalyst bed (O. V. Kiselev — USSR); Characterization of the structure sensitivity in heterogeneous catalysis by the transient response method (M. Kobayashi, T. Kanno, H. Takeda and A. Nakagawa — Japan); Spatial and spatio-temporal structures on catalytic surfaces (D. Luss — USA); Reaction performance under forced unsteady conditions (Yu. Sh. Matros — USSR); Methods of nonlinear dynamics in studies of forced catalytic systems (J. Oršad and M. Marek — Czechoslovakia); Application of unsteady-state processes in modelling of

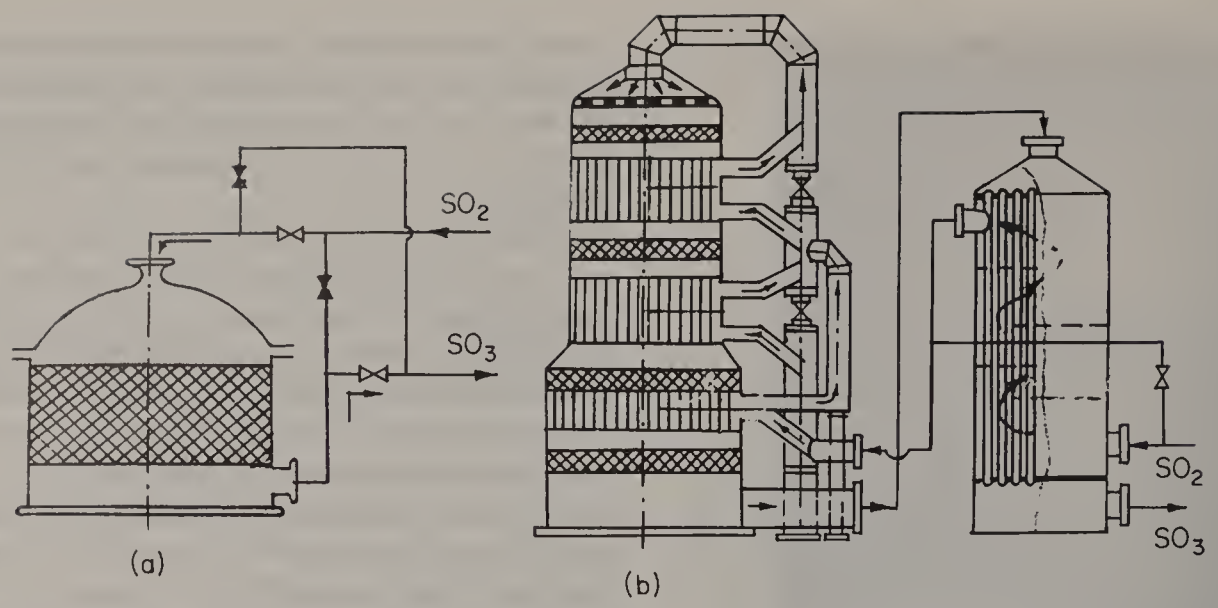


Figure. Flowsheets of reactors operated by (a) unsteady-state and (b) traditional (steady-state) methods.

heterogeneous catalytic kinetics (A. Renken — Switzerland). Dynamics of catalytic reactions on metal surfaces (L. D. Schmidt and R. Aris — USA); Numerical modelling of unsteady frontal regimes of exothermal processes (K. G. Shkainskii — USSR); New applications of periodic operations in reaction engineering (P. L. Silveston — Canada); Investigation of fermentation kinetics by transient methods (J. Villadsen — Denmark); Decoking of fixed-bed catalytic reactors. Analysis of the unsteady-state behaviour (K. R. Westerup — The Netherlands).

During the conference round-table sessions will be held to discuss detailed problems associated with industrial implementation of unsteady-state chemical processes. Conference participants will have the opportunity of seeing the plant for catalytic unsteady-state purification of industrial gases in operation.

The conference languages will be Russian and English. Simultaneous translation will be provided at lectures and discussions.

Full texts of invited lectures and short versions of oral contributions will be published in English as one volume by VNU Science Press, PO Box 346, 3700 AH Zeist, Netherlands (Price USD 69.00). The organizing committee will also publish a collection of abstracts of poster contributions in English and Russian. Every effort will be made to have the conference proceedings available by the beginning of the conference.

Registration fees are: for conference participants USD 250.00; students and post-graduates USD 125.00; accompanying persons USD 75.00. IUPAC affiliates are entitled to a 10% reduction. The registration fee for full participants, students and post-graduates includes the cost of conference proceedings.

Participants will be accommodated in the Hotel "Golden Valley" in Novosibirsk Akademgorodok. The hotel is situated in a picturesque location within walking distance of the conference centre.

The IUPAC Executive Committee visited the Institute of Catalysis, Novosibirsk in May 1988 (see *CI*, Vol. 11, No. 1, page 14, 1989).

Epitaxial crystal growth

The 1st International Conference on Epitaxial Crystal Growth will be held at the Budapest Convention Centre, Hungary, 1–7 April, 1990.

The conference aims to provide a major international forum for the exchange of information on the progress of research and development, as well as the applications of epitaxial crystal growth for those who are actively engaged in these fields. The conference will cover basic and applied research on all kinds of epitaxial crystal growth including metals, dielectrics and semiconductors, homo- and hetero-systems, material growths, characterization and applications.

The official language of the conference will be English.

Further information from: Dr Edmond Lendvay, EPI-1 Conference Chairman, Research Institute of Technical Physics, Újpest 1, PO Box 76, Budapest, Hungary — 1325.

Conference Calendar

Conference circulars and registration forms for the IUPAC-sponsored conferences listed below may be obtained, upon request, from the names and addresses shown in brackets.

1990

Natural products

4–9 February. 17th International Symposium on the Chemistry of Natural Products. New Delhi, India.
(Dr A. V. Rama Rao, Secretary, 17th IUPAC International Symposium on the Chemistry of Natural Products, Regional Research Laboratory, Hyderabad 500 007, India.)

Biological and environmental reference materials

5–8 February. 4th International Symposium on Biological and Environmental Reference Materials (BERM-4). Orlando, Florida, USA.
(Dr. Wayne R. Wolf, Nutrient Composition Laboratory, Beltsville Human Nutrition Research Center, Agricultural Research Service, US Department of Agriculture, Beltsville, MD 20705, USA.)

Porous solids

6–9 May. 2nd International Symposium on Characterization of Porous Solids (COPS-2). Alicante, Spain.
(Prof. F. Rodríguez-Reinoso, Departamento de Química Inorgánica e Ingeniería Química, Facultad de Ciencias, Universidad de Alicante, Apartado 99, Alicante, Spain.)

Carotenoids

20–25 May. 9th International Symposium on Carotenoids. Kyoto, Japan.
(Dr M. Ito, Kobe Women's College of Pharmacy, Motoyamakita-machi, Kobe 658, Japan.)

Polymer networks

20–25 May. 10th International Symposium on Polymer Networks. Jerusalem, Israel.
(Networks 90, Melia-Te'um, POB 8388, Jerusalem 91082, Israel.)

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy.

IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

In the case of the 32nd IUPAC Congress (Stockholm, Sweden: 2–7 August, 1989), it was observed that the time for treating visa applications in Sweden may be as long as five to six weeks. To this must be added the time for handling the applications at the Swedish Embassy in the various countries of the intending participants. This confirms the need for applications to be made not less than three months in advance.

Catalysis

5–8 June. International Symposium on Unsteady State Processes in Catalysis (USPC). Novosibirsk, USSR.
(Prof. K. I. Zamaraev, Institute of Catalysis, 5 Prospekt Academica Lavryentyeva, SU-630090 Novosibirsk 90, USSR.)

Trace elements in health and disease

5–8 June. International Symposium on Trace Elements in Health and Disease. Helsinki, Finland.
(Trace Elements/NTES-COMTOX Meeting, Institute of Occupational Health, Office of Information and International Affairs, Ms Virpi Castrèn, Topeliuksenkatu 41 a A, 00250 Helsinki, Finland. Tel. +358-0-4747 345. Fax. +358-0-4747 548. Telex 121394 tltx sf occuphealth.)

Ceramics

24–30 June. 7th World Ceramic Congress, Montecatini, Italy.
(7th CIMTEC, Satellite Symposium 1, PO Box 174, 48018 Faenza, Italy. Tel. +39 546-664143. Fax. +39 546-664138.)

Macromolecules

8–13 July. 33rd International Symposium on Macromolecules. Montreal, Canada.
(IUPAC MACRO 90 Secretariat, Dept of Chem. Engineering, McGill University, 3480 University Street, Montréal, Québec, Canada H3A 2A7. Tel. +1 (514) 398-7487. Fax. +1 (514) 398-6678.)

Mechanisms of polymer strength and toughness

16–19 July. 13th Discussion Conference on Macromolecules Mechanisms of Polymer Strength and Toughness. Prague, Czechoslovakia.
(13th Discussion Conference, P.M.M. Secretariat, c/o Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 16206 Prague, Czechoslovakia. Tel. +42 (2) 360 341. Cable MACRO PRAGUE. Telex 122109 IMCP C.)

Photochemistry

22–28 July. 13th IUPAC International Symposium on Photochemistry. Warwick, UK.
(Dr J. F. Gibson, 13th IUPAC Symposium on Photochemistry, Royal Society of Chemistry, Burlington House, London W1V 0BN. Tel. +44 (1) 734-9864. Fax. +44 (1) 437-8883.)

Polymer analysis and characterization

23–25 July. 3rd International Symposium on Polymer Analysis and Characterization. Brno, Czechoslovakia.
(Dr Howard G. Barth, Du Pont Company, Experimental Station, Wilmington, Delaware 19898, USA. Tel. +1 (302) 695-4354.)

Organic synthesis

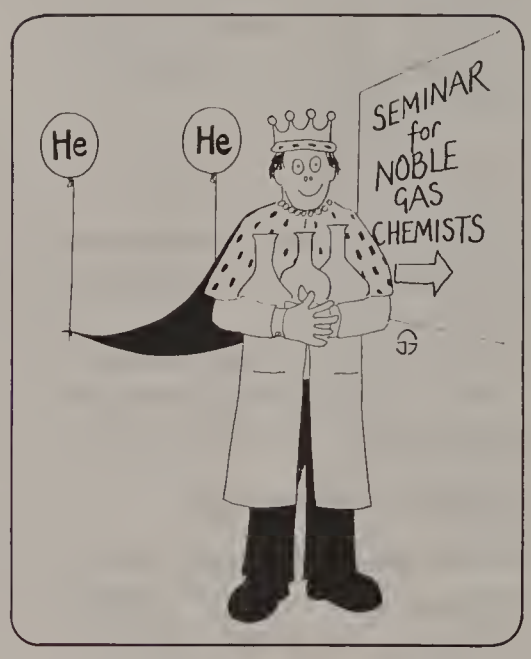
23–27 July. 8th International Conference on Organic Synthesis. Helsinki, Finland.
(Prof. T. A. Hase, c/o Travel Experts Limited, PO Box 722, SF-0010 Helsinki, Finland. Tel. +358 (0) 177 331. Telex 122529 trex sf.)

Boron chemistry

30 July–3 August. 7th International Meeting on Boron Chemistry — IMEBORON VII. Torun, Poland.
(Dr J. K. Ruminski, IMEBORON VII Secretary, Institute of Chemistry, Nicolaus Copernicus University, 7 Gagarin Street, 87-100 Torun, Poland.)

Solubility phenomena

1–3 August. 4th International Symposium on Solubility Phenomena. Troy, New York, USA.
(Dr Mark Salomon, Co-Chairman, 4th International Symposium on Solubility Phenomena, PO Box 254, Fair Haven, N.J. 07704, USA.)



Pesticide chemistry

5–11 August. 7th International Congress of Pesticide Chemistry. Hamburg, Federal Republic of Germany.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany. Tel. +49 (69) 7917-360 or +49 (69) 7917-365. Fax. +49 (69) 7917322 and 7917475.)

Solution chemistry

6–10 August. 11th International Conference on Solution Chemistry. Ottawa, Canada.
(Prof. C. Deteller, Department of Chemistry, University of Ottawa, Ottawa, Ontario K1N 9B4, Canada.)

Physical organic chemistry

6–10 August. 10th International Conference on Physical Organic Chemistry. Haifa, Israel.
(Prof. Yitzhak Apeloig, Department of Chemistry, Technion-Israel Institute of Technology, Haifa, 32000, Israel. Tel. +972 (4) 293111. Telex 46406.)

Carbohydrates

12–17 August. 15th International Carbohydrates Symposium. Yokohama, Japan.
(Prof. Yoshiharu Ishido, General Secretary, 15th International Carbohydrate Symposium, c/o Department of Chemistry, Faculty of Science, Tokyo Institute of Technology, O-okayama, Meguro-ku, Tokyo 152, Japan.)

Raman spectroscopy

13–17 August. 12th International Conference on Raman Spectroscopy. Columbia, South Carolina, USA.
(Prof. J. R. Durig, College of Science and Mathematics, University of South Carolina, Columbia, South Carolina 29208-0001, USA. Tel. +1 (803) 777 2505. Fax. +1 (803) 777 3065. Telex 573414 UNIVSCAROL.)

Coordination chemistry

13–18 August. 28th International Conference on Coordination Chemistry. Gera, GDR.
(Dr. D. Walther, Sektion Chemie der Friedrich-Schiller-Universität. Steiger 3, Haus 111, Jena 6900, German Democratic Republic.)

Organometallic chemistry

19–24 August. 14th International Conference on Organometallic Chemistry. Detroit, Michigan, USA.
(Professor John P. Oliver, The Secretariat, 14th International Conference on Organometallic Chemistry, 135 Chemistry Building, Wayne State University, Detroit, MI 48202, USA.)

Chemical thermodynamics

27–31 August. 11th IUPAC Conference on Chemical Thermodynamics. Como, Italy.
(11th IUPAC Conference on Chemical Thermodynamics, c/o Dip. to Chimica Fisica Applicata, Politecnico di Milano, Via Golgi, 39, 20133 Milano MI, Italy. Tel. +39 (2) 2363770/2664317/ 2364522. Fax. +39 (2) 2664950.)

Polymerization reactions

9–13 September. International Symposium on Mechanisms and Kinetics of Polymerization Reactions: Their Use in Polymer Synthesis. Paris, France.
(SYMPOL 90 — Secrétariat, Laboratoire de Chimie Macromoléculaire, Université Pierre et Marie Curie — UA 24, Tour 44 — 1er étage, 4 Place Jussieu, 75252 Paris Cedex 05, France. Tel. +33 (1) 43 36 25 25 ext. 5541. Fax. +33 (1) 43 54 40 97. Telex UPMC SIX 200 145 F.)

Safety in chemical production

10–13 September. 1st IUPAC Workshop on Safety in Chemical Production. Basel, Switzerland.
(This workshop is not open for general participation but restricted to a limited number of invited participants.)

Automation and new technology in the clinical laboratory

9–12 October. 4th International Congress on Automation and New Technology in the Clinical Laboratory. Barcelona, Spain.
(Dr Roman Galimany, Seccióde Automatizaci ón. Servicio de Bioquímica, Residencia Sanitaria Germans Trias i Pujol, Carretera Canyet s/n. 08916 Barcelona, Spain.)

Speciality polymers

7–9 November. International Symposium on Speciality Polymers. Singapore.
(International Symposium on Speciality Polymers, c/o Department of Chemistry, National University of Singapore, 10 Kent Ridge Crescent, Singapore 0511.)

1991

Polymer materials

10–15 February. Polymer 91: International Symposium on Polymer Materials: Preparation, Characterization and Properties. Melbourne, Australia.
(Polymer 91 Secretary, PO Box 224, Belmont, Victoria 3216, Australia. Fax. +61 (52) 47 26 57.)

"Organic chemistry: technological perspectives"

15–19 April. 2nd International Symposium "Organic Chemistry: Technological Perspectives". Baden-Baden, Federal Republic of Germany.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/ Main 90, Federal Republic of Germany.)

Spectroscopy

9–14 June. 17th Colloquium Spectroscopicum Internationale. Bergen, Norway.
(Prof. F. J. Langmyhr, Department of Chemistry, University of Oslo, PO Box 1033, Blindern, 0315 Oslo 3, Norway.)

Surface and colloid science

7–12 July. 7th International Conference on Surface and Colloid Science. Compiégne, France.
(Prof. M. Clausse, Université de Technologie de Compiégne Cedex, France.)

IUPAC Congress

17–22 August. 33rd IUPAC Congress. Budapest, Hungary.
(33rd IUPAC Congress, Prof. E. Pungor, c/o Hungarian Academy of Sciences, H-1111 Budapest, Gellért tér 4, Hungary.)

Organometallic chemistry

25–29 August. 6th International Symposium on Organometallic Chemistry Directed Toward Organic Synthesis (OMCOS). Utrecht, Netherlands.
(Prof. G. van Koten, Laboratory of Organic Chemistry, Department of Metal Mediated Synthesis, University of Utrecht, Padualaan 8, 3584 CH Utrecht, The Netherlands.)

Analytical sciences

25–31 August. International Congress on Analytical Sciences. Chiba, Japan.
(Prof. Eiji Niki, The Japan Society for Analytical Chemistry, 1-26-2-304 Nishigotanda, Shinagawa, Tokyo 141, Japan.)

1992

Macromolecules

13–18 July. 34th International Symposium on Macromolecules. Prague, Czechoslovakia.
(Dr P. Čefelín, Deputy Director, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovského n. 2, 162 06 Prague 6-Petriny, Czechoslovakia.)

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41 Alkali Metal Perchloratres
42 Hydrogen Halides in Nonaqueous Solvents

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PURE AND APPLIED CHEMISTRY

Official Journal of the International Union of Pure and Applied Chemistry

Executive Editor

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NEW TITLES IN THE SOLUBILITY DATA SERIES

Hydrogen Halides in Non-Aqueous Solvents

Edited by **P G T Fogg & W Gerrard**, *Polytechnic of North London, Holloway, London, UK*

Volume 42 of the *Solubility Data Series* contains evaluated data for the solubility of hydrogen fluoride, hydrogen chloride, hydrogen bromide and hydrogen iodide in non-aqueous solvents. Information on about four hundred systems is included. Hydrogen halides take part, either as reactants or products, in many reactions of organic compounds. Evaluated solubility data for these gases are required for the prediction of the course and mechanism of such reactions. The volume will therefore be of especial interest to organic chemists and to chemical engineers concerned with syntheses involving halogen compounds in non-aqueous media.

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X= Solubility Data Series, Volume 42
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Halides, Oxyhalides and Salts of Halogen Complexes of Titanium, Zirconium, Hafnium, Vanadium, Niobium and Tantalum

Edited by **J Hala**, *J E Purkyne University, Brno, Czechoslovakia*

Halides, oxyhalides, and salts of halogen complex ions containing elements of groups four and five (titanium, zirconium, hafnium, vanadium, niobium and tantalum) is Volume 40 of the series. The volume covers all relevant data on the solubility of the title compounds of Ti(III, IV), Zr(IV), Hf(IV), V(II, III, IV, V), Nb(V) and Ta(V) as published in the literature up to mid-1988. The solubilities of these substances in aqueous, nonaqueous, binary and multicomponent systems are compiled. Critical evaluations are presented for a number of the systems. The volume will be of interest to hydrometallurgists, inorganic and analytical chemists, and to all who work with the chemistry and technology of group four and five metals.

Contents: Section headings: Aviezer Stevan Kertes: a personal appreciation, Y Marcus. Publications of A S Kertes. Introduction to the solubility of solids in liquids. Acknowledgement. The solubility of titanium halide and oxyhalide substances. The solubility of zirconium halide and oxyhalide substances. The solubility of hafnium halide and oxyhalide substances. The solubility of vanadium halide and oxyhalide substances. The solubility of niobium halide and oxyhalide substances. The solubility of tantalum halide and oxyhalide substances. System index. Registry number index. Author index.

X= Solubility Data Series, Volume 40
0 08 0362397 (H) US$85.00 364pp Due Nov 1989

Cumulative Index Volumes 20-38

Edited by **C L Young**, *Department of Chemistry, University of Melbourne, Parkville, Victoria, Australia*

This *Cumulative Index* covers Volumes 20 to 38 of the *Solubility Data Series*. The first cumulative index, Volume 19, published in 1985, covered the first eighteen volumes of the series. Both indexes have been produced to enable workers to locate data both for the system of interest and closely related systems without the necessity of consulting the indexes of individual volumes. The index consists of three sections: a System Index, an Author Index and a Chemical Contracts Registry Number Index.

Contents: Section headings: System Index. Registry Number Index. Author Index.

X= Solubility Data Series, Volume 39
0 08 0372058 (H) US$85.00 382pp approx Due Nov 1989

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries;
- to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;
- to co-operate with other international organizations which deal with topics of a chemical nature;
- to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 46 countries, each represented by a national organization, such as an academy of science or research council.

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1990, Vol. 12. No. 1 (January)

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Front cover: Empresa Nacional de Petroleo Refinery, Concepción, Chile. *(Photo courtesy UNESCO/Peter Larsen.)*

1990 International Union of Pure and Applied Chemistry

Affiliates at NIST

The National Institute of Standards and Technology, Gaithersburg, USA, was the venue of the 6th International Conference on High Temperatures. During the conference Affiliate Affairs Secretary and Editor of *Chemistry International* Michael Freemantle met some IUPAC affiliates on the staff at NIST.

National Institute of Standards and Technology (NIST), formerly known as National Bureau of Standards, employs a staff of 3000.

Whether the object is to build a better-integrated circuit, a tougher industrial ceramic, or an improved enzyme; whether the goal is greater safety, faster production, or a higher-quality product; accurate measurement is often the end, and always the means. Since its inception as the National Bureau of Standards (NBS) in 1901, providing science and industry in the USA with a basis for accurate measurement has been the mission of the National Institute of Standards and Technology (NIST).

The science of measurement affects nearly every segment of the economy. International trade, indeed almost any exchange of commodities from a tanker full of oil to a tank full of gas relies on measurement. The control of manufacturing processes to produce quality goods depends critically on accurate measurement — particularly in those high-technology fields such as advanced ceramics, superconductivity, opto-electronics, and biotechnology which are becoming increasingly important on the economic scene.

For these and other areas of technology, NIST develops the standards, measurement techniques, reference data, test methods, and calibration services that help to ensure measurement capability and compatibility in the USA and internationally. An agency of the Department of Commerce, NIST has no regulatory powers. However, its researchers — such as IUPAC affiliate John Maurey of the Polymer Science Division — work closely with voluntary standards-setting organizations as well as other federal agencies.

Closer collaboration with industry and universities

With the enactment of the Omnibus Trade and Competiveness Act in 1988 which gave the agency its modern name, one NIST mission took on additional importance: to aid US companies in adopting new technologies and scientific advances. Among other things, NIST was given assignments to aid small and medium-sized companies and consortia through several technology development and transfer programmes.

Researchers from industry and universities regularly work in NIST laboratories with institute experts on projects of mutual interest. For example, engineers, machinists, and computer specialists from private companies and universities have joined NIST researchers to develop the quality-control techniques and the computer software interface standards needed for the automated factory of the future.

To bring automated manufacturing technology to small and medium-sized manufacturing firms, NIST has begun a manufacturing technology centres programme. The programme is designed to establish regional centres that will help these companies improve their technical capabilities and competitiveness.

NIST also has some of the premier research and testing facilities in the USA. These facilities are available for co-operative or proprietary research. For instance, about 200 scientists use the institute's 20-megawatt research reactor each year for studies in environmental chemistry, biomedicine, and materials science.

Among other NIST facilities are a synchrotron ultraviolet radiation facility, an automated manufacturing research facility, a large-scale structures test facility, several environmental chambers, a metals processing laboratory, a fire research facility, a low background infra-red facility, and a computer and network security facility.

IUPAC affiliates (from left): John Maurey, Sharon Lias and Bettijoyce Lide.

Operated on an annual budget of about USD 260 million, the institute employs a staff of some 3000 at its headquarters in Gaithersburg, Maryland, and its site in Boulder, Colorado. In Gaithersburg, there are 27 buildings on 579 acres; in Boulder, researchers work in 14 buildings on 205 acres.

Amongst the IUPAC affiliates on the staff at NIST are Scientific Assistant Bettijoyce Lide. She registered an interest in chemical databases on the affiliate membership registration form. Her husband, David Lide, was President of the IUPAC Physical Chemisty Division and was also the first Chairman of the Committee on Chemical Databases.

Affiliate Malcolm Chase of the Center for Chemical Physics at NIST gave a lecture on "Thermodynamic properties of the alkaline earth hydroxides" at the 6th International Conference on High Temperatures held at NIST in April 1989 (see *CI*, Vol. 12, No. 1, pp. 28–31). Chase also presented a personal computer demonstration of thermodynamic databases in the poster session on thermochemistry and models.

Like John Maurey, Fred Brinckman is an affiliate who conducts research in the Polymer Science Division at NIST. Brinckman has developed and directed the bioprocessing programme, and been the author or co-author of more than 90 publications on the results from research and development in materials bioprocessing. Much of his recent work has focused on problems of heavy metal pollution in the environment. He presented a lecture on "Atmospheric and marine trace chemistry: interfacial biomediation and monitoring" at the 32nd IUPAC Congress held in Stockholm, August 1989.

Sharon Lias, who is Chief of the Chemical Kinetics Division and Director of the Mass Spectrometry Data Center at NIST, has been an IUPAC affiliate since 1986 — when the affiliate membership programme started. Projects in her division include: combustion chemistry; kinetics of environmental processes; planetary atmospheres; and gas-phase thermochemical properties of ions (a project in which Lias has been specifically involved).

Standard reference materials

Standard reference materials (SRMs), as defined by NIST, are well-characterized materials produced in quantity and certified for one or more physical or chemical properties. They are used to assure the accuracy and compatibility of measurements. SRMs are widely used as primary standards in many diverse fields in science, industry, and technology, both within the USA and throughout the world. They are also used extensively in the fields of environmental and clinical analysis.

Stanley Rasberry is Chief of the NIST Office of Standard Reference Materials. He is closely involved with the work of IUPAC not only as an affiliate but also as a co-opted member of the Physical Chemistry Division and Chairman of the Subcommittee on Reference Materials in Chemistry.

In many applications, traceability of quality control and measurement processes to the national measurement system are carried out through the mechanism and use of SRMs. NIST offers for sale over 900 different materials through its Office of Standard Reference Materials whose Chief is IUPAC affiliate Stanley Rasberry.

The materials produced by NIST are primarily SRMs certified for their chemical composition, chemical or physical properties, but also include other reference materials. All materials bear distinguishing names and numbers by which they are permanently identified. Thus, each material bearing a given description is identical (within specified limits) to every other sample bearing the same designation — with the exception of individually certified items, which are further identified by serial number.

The following are a few examples of the SRMs produced by NIST.

- AISI 4340 steel (SRM 661)
- Nickel oxides, powder form (SRMs 671-3)
- Mineral glasses for microanalysis (SRM 470)
- Human serum (SRM 909)
- Lead in blood (SRM 955)
- Carbon monoxide in air (SRM 2613-4)
- Bullet lead (SRM C2416)
- Toxic metals in freeze-dried urine (SRM 2670)

For further information about NIST programs please contact: Diane Lay, E128 Administration Bldg, National Institute of Standards and Technology, Gaithersburg, MD 20899, USA. Tel: +1 (301) 975 3058. Information about SRMs can be obtained from the Office of Standard Reference Materials at the same address.

Meeting of affiliates in Cuba

An *ad hoc* meeting of IUPAC affiliates from Cuba will be arranged to coincide with three scientific events which will be held at the National Scientific Research Center (CENIC) in Havana City from 31st October to 3rd November 1990. Brief details of these events are given on page 78 in the conference section.

120 affiliates active on IUPAC commissions and committees

A comparison of the 'Alphabetical Index to Members of IUPAC Bodies 1987-1989' in the *IUPAC Handbook 1987-1989* (pages 51–134) with the IUPAC affiliate membership database, has revealed that 120 members of IUPAC bodies were affiliates in the biennium leading up to the Lund General Assembly. A breakdown by country shows that exactly 50% of these affiliates were from the USA:

Country	Number of affiliates on IUPAC bodies
Belgium	2
Canada	3
Czechoslovakia	7
Denmark	1
FRG	1
France	7
Hungary	1
Italy	4
Japan	16
The Netherlands	4
Republic of South Africa	3
Sweden	1
UK	9
USA	60
Yugoslavia	1
TOTAL (15 countries)	120

Annual affiliate meetings in Ethiopia

The first ever national meeting of a group of affiliates was held in Ethiopia last year at Addis Ababa University on 10th August on the eve of the annual congress of the Chemical Society of Ethiopia (CSE).

The CSE President welcomed affiliates to the meeting and informed them that the CSE Executive Committee wished to strengthen affiliate activities in respect of the scheme — which was implemented in 1986. He urged affiliates to suggest ways and means of operating the scheme effectively in Ethiopia in light of the report of the National Affiliate Membership Secretary Ghirma Moges.

Following his welcoming address, a letter of greetings from IUPAC Affiliate Affairs Secretary, Michael Freemantle, was read out to the affiliates. The letter congratulated CSE and Ethiopian affiliates on the occasion of the first ever national affiliate meeting to be held anywhere in the world.

National Affiliate Membership Secretary Ghirma Moges then presented his report. He outlined the objectives and benefits of the affiliate membership scheme and discussed current developments and problems. The report provoked discussion which led to the following recommendations for improvements of affiliate activity in Ethiopia:

1. The number of sponsored affiliates in Ethiopia grew from 10 in 1986 to 33 in 1989. The sudden decrease in membership to 20 for 1990 represented a weakening of the scheme in the country. Affiliates strongly urged IUPAC to at least maintain the existing number. (*Ed*: In response, IUPAC has reviewed the situation and has proposed an increase to 35 sponsored memberships for 1990.)

2. Affiliates agreed on a proposal that an annual meeting of Ethiopian affiliates should be held on the eve of the CSE congress each year.
3. The level of interaction of affiliates with IUPAC commissions and divisions was not clear at the moment. This led to a recommendation that affiliates complete questionnaires which might serve as a report.
4. Delays in the distribution of *CI* was also discussed. The distribution of *CI* and other publications should be made through the CSE Secretariat which would soon be equipped with a telephone.

News & Views

Acquainted with IUPAC in 1938

Dr Reinhard Marcuse of Gothenburg, Sweden, first became acquainted with IUPAC in 1938 when he was studying in Italy. He happened to be in Rome and was passing an opera house when he saw a lot of fine black cars drawing up outside. He enquired what was going on and was told that it was a meeting of IUPAC. He was invited in to see the performance of Cavaleria Rusticana, directed by the composer Mascagni himself. That was his introduction to IUPAC.

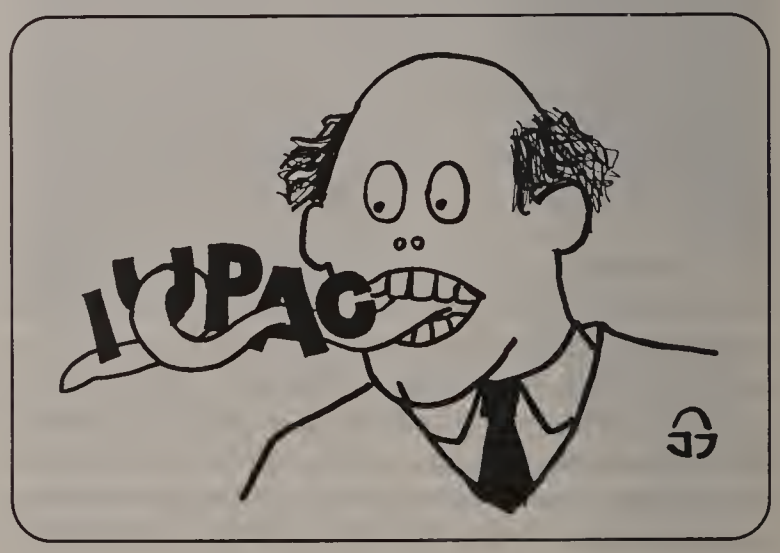
He is pictured here at the IUPAC General Assembly in Lund last year. He attended the meeting of the Commission on Oils, Fats and Derivatives as an observer from Lipid Forum, the Scandinavian fat research organization which he helped to develop in the 1950s and of which he is now Secretary General. According to Marcuse, Lund will probably be his last IUPAC General Assembly.

In the early 1950s he attended an IUPAC meeting in New York, when the American Chemical Society was celebrating its jubilee and there was also an IUPAC anniversary celebration. In 1969 he became a member of the Food Section, of which he subsequently became chairman. He was also secretary of the Applied Chemistry Division.

IUPAC pronunciation poses platform problems

Allan Ure, who was official IUPAC representative at SAC 89 — International Conference on Analytical Chemistry held in Cambridge, UK last year, made an unusual point in his conference report. He wrote: "It became clear that there is no standard pronunciation of the abbreviation IUPAC. Both 'You Pack' and 'Eye You Pack' were in use. Nomenclature requires definition for platform use".

The problem was referred to the IUPAC Commission on Articulation of Acronyms (IX.9) which meets regularly with experts from the Global Research Organization for Professional Enunciation Studies (GROPES for short) at the Bull and Bush (conference centre) in Oxford. The commission decided to monitor IUPAC pronunciation on all IUPAC-sponsored conference platforms until the year 2001 in order to obtain a consensus view. They would then report on their findings. Meanwhile the commission confirms that both modes of pronunciation are permissable on the platform. However, if in any doubt, speakers might prefer to use "Eye You Pea A Sea".



Crystallographic nomenclature recommendations

The International Union of Crystallography has recently produced three nomenclature reports:

"Statistical descriptors in crystallography", published in *Acta Cryst.* (Vol. A45, pp. 63–75, 1989) contains a dictionary of statistical terms used by experimentalists in the field, provides a statistical basis for refinement procedures and deals with defects in the physical model used for refinement and with the choice and significance of weight assignment. It concludes with a series of recommended procedures.

"Definition of symmetry elements in space groups and point groups", published in *Acta Cryst.* (Vol. A45, pp. 494–499, 1989) gives a general definition of geometric elements and shows that a "symmetry element" may be defined as a concept with a double meaning, namely the combination of a geometric element with the set of symmetry operations having this geometric element in common.

"Nomenclature of inorganic structure types" (in press: *Acta Cryst.* Section A) presents a terminology that defines different degrees of similarity between inorganic crystal structures and also a notation for the coordination of the atoms involved. These, together with some additional basic rules, allow a crystal-chemical formula to be written that provides detailed information concerning the structural units present, their constitution, their packing arrangement, the identification of interstitial atoms and the coordination of all independent atoms.

For further information contact: S. C. Abrahams, Chairman, IUCr Commission on Crystallographic Nomenclature, Institut für Kristallographie der Universität Tübingen, Charlottenstr. 33, D-7400 Tübingen, FRG.

Pure chemists

Herbert Pratt of New Castle, Delaware, (USA) saw a notice about the "30th Congress of the International Union of Pure and Applied Chemists". Says Pratt, "A new standard of morality for our profession". *From* C & E N *page 136, October 2, 1989.*

New Head of South African ICSU Secretariat

Marijke Swierstra has taken over as Head of the South African ICSU (International Council of Scientific Unions) Secretariat following the retirement of Enid du Plessis.

Swierstra was previously attaché at the South African Science and Technology Office in Washington DC, USA. Before taking up her new post she

Marijke Swierstra.

visited Europe and included the IUPAC Secretariat in Oxford on her itinerary. She also visited the ICSU Secretariat at the Royal Society, London and travelled to Stockholm, Sweden to meet Professors Inga Fischer-Hgalmars and Olaf Tandberg both of whom are members of the ICSU Standing Committee for the Free Circulation of Scientists.

Names and addresses

Full details (names, addresses, telephone/telex/fax numbers) of all commission and committee chairpersons and secretaries and IUPAC officers were published in the November 1989 issue of *CI* (Vol. 11, No. 6, pp. 225–235). The IUPAC Secretariat has since been notified of the following additions and changes:

Prof. A. J. Bard (Vice-President). Fax: +1 (512) 471 0088.

Prof. Irina P. Beletskaya (President, Organic Chemistry Division). Telex: 411483 MGU SU. Fax: +7 (095) 939 0126.

Prof. M. Chastrette (Chairman, Committee on Teaching of Chemistry). Tel: +33 72 44 80 00. Fax: +33 72 44 08 03.

Dr P. Kratochvíl (Chairman, Commission on Macromolecular Nomenclature). Fax: +42 (2) 36 79 81.

Prof. N. Montalbetti (President, Clinical Chemistry Division). Fax: +39 (2) 680064.

Dr W. J. G. M. Peijnenburg (Secretary, Commission on Water Chemistry). Rijksinstituut voor Volksgezondheid en Milieuhygiene, PO Box 1, Antonie van Leeuwenhoeklaan 9, 3720 BA Bilthoven, The Netherlands. Tel: +31 (30) 749111. Telex: 47215 RIVM NL. Fax: +31 (30) 742971.

Prof. A. M. Sargeson (Chairman, Commission on Nomenclature of Inorganic Chemistry). Fax: +61 (62) 490750.

Prof. J. F. G. Vliegenthart (IUB-IUPAC Joint Commission on Biochemical Nomenclature). Fax: +31 (30) 540980.

Letters to the Editor

Equilibrium constant symbol

Sir,

The IUPAC Green Book, *Quantities, units and symbols in physical chemistry* (Blackwell Scientific Publications, Oxford, 1988) recommends using either K or K° for the thermodynamic equilibrium constant. Prof. I. Mills points out (5th September, *Chem. Eng. News*, p. 3) that those who feel uneasy with K° are free to use K, and he suggests that the choice of K or K° be left up to each individual user. I object to the notation K°, as an alternative to K, on the grounds that it is an abuse of the superscript $^\circ$ notation.

In dealing with thermodynamic standard states there are two ideas involved: (i) the relevant species are actually *in* their standard states and (ii) the numerical value of the thermodynamic quantity under discussion depends on the choice of standard states for the relevant species. Now if condition (i) holds, then condition (ii) follows automatically; however, condition (ii) can hold without condition (i) holding at the same time — in the equilibrium constant K for example. The superscript $^\circ$ symbol is used to mean condition (i) exclusively. IUPAC now proposes (implicitly, operational redefinition) to let the superscript $^\circ$ symbol stand for either condition (i) or condition (ii): in the relation $\Delta_r G^\circ = -RT \ln K^\circ$, on the left we have condition (i) and on the right we have condition (ii).

It would be far better to use two different notations for the two ideas: superscript $^\circ$ for condition (i) and (say) left subscript $_\circ$ for condition (ii) — then we would have $\Delta_r G^\circ = -RT \ln {}_\circ K$ with no confusion or sense of unease. The subscript $_\circ$ for condition (ii) would also be available to label the dimensionless forms of K_p and K_c: ${}_\circ K_p$, where the pressures are given in dimensionless form p_i/p_i° (p_i° being 1 bar or 1 atm or etc.); ${}_\circ K_c$, where the concentrations are in dimensionless form C_i/C_i° (C_i° being 1 mol L^{-1} or 1 mol m^{-3} or etc.). The numerical values of ${}_\circ K_p$ and ${}_\circ K_c$ clearly depend on the choice of reference state, so the condition (ii) symbol, left subscript $_\circ$, is appropriate.

It is thus possible to achieve the IUPAC goal, the flagging of the equilibrium constant symbol to show that its numerical value depends on the choice of standard states, in a reasonably way without abusing the standard signification of the superscript $^\circ$ symbol.

Ralph J. Tykodi
Affiliate Member
Southeastern Massachusetts University
N. Dartmouth, MA, USA

Sir,

In reply to Prof. Tykodi's letter, I can only comment that I feel he is making a mountain out of a molehill. I would say that the distinction between his ideas (i) and (ii) is too subtle for most every-day users of thermodynamics.

I would say that the relation between the standard Gibbs energy of reaction, $\Delta_r G^\ominus$, and the standard equilibrium constant, $K^\ominus$, is analogous to the relation between the chemical potential, μ_i, and the absolute activity, λ_i, of a species i. The relations are:

$$\lambda_i = \exp(\mu_i/RT), \text{ and } K^\ominus = \exp(-\Delta_r G^\ominus/RT).$$

I would regard λ_i as an alternative way of writing μ_i. There is a certain element of redundancy; we could do without one of them (and indeed the absolute activity is a quantity which is not much used in daily applications of thermodynamics). But it is sometimes convenient to have both of the quantities λ_i and μ_i available. In a similar way I regard $K^\ominus$ and $\Delta_r G^\ominus$ as alternative ways of characterizing the equilibrium in a chemical reaction, but in this case most people find it convenient to make use of both quantities in applying thermodynamics to chemical equilibrium.

I find it difficult to understand why someone would wish to attach the standard symbol to $\Delta_r G^\ominus$ and yet resist attaching the same symbol to $K^\ominus$. It seems to me illogical. Whatever the meaning of the standard symbol, if it is appropriate in one case then it is equally appropriate in the other.

I feel this is a point on which different people hold different views, and there is little more to be said at the moment. In choosing symbols for quantities some element of freedom is left to authors. As we note in the Green Book (page 11), "authors are free to choose any symbols they wish for the quantities they discuss, provided they . . . conform to the general rules . . .". Symbols for quantities do not have the mandatory force of symbols for units. If, at the end of the day, different authors sincerely hold different views on the question of which is the most helpful notation, then may each follow his choice (taking appropriate care to define his notation), and in the course of time we shall see which notation comes to be more widely used.

Ian M. Mills
Secretary, Commission I.1
University of Reading, UK

Editor's note: Tykodi uses the superscript $^\circ$ to indicate standard whereas Mills uses $^\ominus$. Note (9) on

page 44 of the Green Book states: "The symbol ° or ⊖ is used to indicate standard. They are equally acceptable".

Criteria for labelling the Periodic Table

Sir,

An interesting contrast was presented in the September 1989 issue of *CI*. The group on transfermium elements spent a long time discussing criteria. In contrast, a few chemists present criteria for a particular labelling system for columns (groups, families) in periodic tables. Although Dr Nelson did consider a few, in most cases the critieria are not considered explicitly.

Before going on, let me point out a few facts. Periodic tables are arrangements of elements according to atomic numbers, not electron configurations. As a prime example, consider nickel, palladium and platinum whose configurations are $3d^8\ 4s^2$, $4d^{10}$ and $5d^9\ 6s^1$, respectively. Also, elements in a family have similar chemistry, and are not identical, differing, for example, in maximum oxidation numbers. In addition, any scheme for labelling works best on a particular form of table.

Let me propose some critieria which seem to me to be basic:

1. The system of labelling families should be as simple as possible.
2. At the same time, it should convey as much chemical information as possible, although no scheme is perfect.
3. It should be international in form, because chemistry is international.
4. It should transfer easily to other forms, even though it works best on a particular form.
5. Even though this is of lower importance, the preferred form should use space efficiently on the page.

The present 1-18 system recommended by IUPAC satisfies all these criteria. It is certainly simple. It conveys a large amount of chemical information, for example: (i) it indicates secondary relationships, such as between Groups 1 and 11; and 6 and 16; (ii) it does a better job of correlating with maximum oxidation numbers than others; (iii) it does as well as others in giving outer electron configurations (Group 16 has six outer electrons, and a maximum oxidation number of 6, except oxygen, which is +2).

The 1-18 scheme is the only one which is truly international, because it uses only Arabic numerals (using letters of western European languages is provincial). A few trials will show that it transfers better than other schemes to other forms of the Periodic Table, even though it applies best to the so-called "long form". The latter table uses space most effictively, since it is approximately a rectangle.

R. Thomas Myers
Affiliate Member
Kent State University
Ohio, USA

Chemical Sciences in Development

Last August, at the 35th IUPAC General Assembly, the International Organization for Chemical Sciences in Development became an Associated Organization of IUPAC. IOCD Executive Director Bob Maybury describes the purposes and activities of the organization.

Introduction

- Each year, as many as a billion people — almost 25% of the world's population — suffer from a variety of tropical diseases for which there are no cures.
- Millions of children in developing countries are malnourished, many even dying of hunger each year.
- And each year, hundreds of Third World scientists return home from training in the great universities of the industrialized countries well prepared to tackle these problems — only to be frustrated in their efforts by a shortage of technical equipment, a lack of access to up-to-date scientific information, and isolation from the mainstream of research and the interaction with colleagues that is so vital to creative scientific work.

Into this situation has stepped the International Organization for Chemical Sciences in Development (IOCD), a group of internationally renowned scientists — including four Nobel Prize winners. IOCD is helping many Third World scientists to harness the chemical sciences to solving long-standing problems in the fields of health, population, and agriculture.

Millions of children in developing countries are malnourished. IOCD is helping many Third World scientists to harness the chemical sciences to solve problems in the fields of health, population and agriculture.

A non-governmental, non-profit group

Formed in 1981 by scientists from 15 countries, IOCD is a non-governmental and non-profit agency chartered in Belgium. IOCD's scientific working groups draw scientists from Third World countries into collaboration with scientists from industrial countries in research focused on areas of vital development concern: unchecked population growth, persisting parasitic diseases, and declining agricultural productivity. The scientists in IOCD's working groups represent the broad geographic regions of Africa, Asia, Latin America and the Middle East.

Working groups get promising results

IOCD's Working Group on Tropical Diseases, for example, involves 16 laboratories around the world in its work. The group has tested over 100 chemical compounds to date, several of which show promise in treating devastating ailments found in developing countries.

The Working Group on Fertility Regulation engages scientists in 10 laboratories in both Third World and industrial countries in a search for a practical male birth control chemical.

IOCD's Working Group on Plant Chemistry is examining the wide variety of plants growing in developing counties in a search for chemical constituents with pesticidal activity, medicinal efficacy, or some other useful property.

Through participating in IOCD's working groups, Third World scientists play an active part in the search for new knowledge in the chemical sciences that can benefit their countries. This participation also enables them to surmount the isolation from the research mainstream and to keep their competence at the high levels required to undertake other scientific or technical tasks their countries may ask of them.

IOCD Executive Director Bob Maybury is an IUPAC affiliate and recent retiree from 20 years with Unesco Science Sector.

Providing vital technical services

Another important way IOCD is assisting Third World scientists is to offer them certain technical services at no charge. IOCD's scheme of Analytical Service Centers will submit a scientist's compound to analysis by magnetic resonance spectroscopy or mass spectroscopy, for example; methods that require sophisticated and costly apparatus often not available in Third World countries. Similarly, the IOCD Biological Screening Service will test chemical compounds for their biological activity. Tests include activity against parastic diseases and activity as a pesticide or fungicide. IOCD is able to provide this service through the cooperation of a number of leading institutes, research centres and universities.

How IOCD is governed

Although the scientists who created IOCD were convened by UNESCO, IOCD is an independent, non-governmental agency. This gives it flexibility and responsiveness, and enables it to work in ways that complement international governmental organizations.

Overall policy in IOCD is set by a Council of distinguished scientists, including four Nobel Laureates: Glenn T. Seaborg, who is President of

The Executive Committee of the IOCD Council met in London, UK, in October 1988. Seated, from left to right are Prof. "Ram" Rao (Vice-President); Prof. Glenn Seaborg (President); Prof. Elkan Blout (Vice-President) and Prof. Josef Fried (Chairman, Working Group on Fertility Regulation).

IOCD, University Professor of Chemistry at the University of California, Berkeley, and former president of the American Chemical Society; Sune Bergström, President of the Nobel Foundation and professor at the Karolinska Institute, Stockholm; Norman Borlaug, Wheat Program Director, International Maize and Wheat Centre (CIMMYT), Mexico, who is known as the "father" of the Green Revolution; and Jean-Marie Lehn, Professor of the Collège de France and the Université Louis Pasteur, France.

The Council delegates responsibility to an Executive Committee, which meets twice a year to review programme and budget. the overall activity of IOCD is managed by an executive director.

The leadership of each working group includes a chairman, a vice-chairman, and several advisors who are internationally recognized specialists in the working group's particular field of research. The Third World scientists who participate in the working group are called principal investigators.

Financial resources

IOCD and its US affiliate (called the Organization for Chemical Sciences in Development, OCDI) are supported by contributions from individuals, donations from corporations, and grants from both private foundations as well as from government and international funding sources. These sources of income are used to support the working groups, principally through supply stipends, equipment, technical services and administrative oversight to the participating Third World scientists.

As a memorial to the late Dr Pierre Crabbé, IOCD's Director from its founding in 1981 to his death in 1987, IOCD maintains the Pierre Crabbé Initiatives Fund. Gifts to this fund permit IOCD to support highly innovative activities among Third World Scientists.

More information on IOCD

Detailed descriptions of the research being conducted by IOCD's working groups appear in the following paragraphs. Additional information on IOCD activities appears in the IOCD *Information Letter,* published twice yearly and available free of charge upon request.

Scientists in Third World countries interested in any of the IOCD programmes are invited to write to the Secretariat. Inquiries concerning admission to a working group will be forwarded to the appropriate group chairman.

IOCD Officers

President: Prof. Glenn T. Seaborg
Vice-President and Treasurer: Prof. Elkan R. Blout
Vice-President: Prof. C. N. R. Rao

IOCD Secretariat

Dr Robert Maybury,
Executive Director, IOCD (USA Office),
PO Box 8156, Falls Church,
Virginia 22041, USA

Dr Carlos Rius,
Assistant Director, IOCD,
Coordinación de Ciencias,
Ciudad Universitaria — UNAM,
Apartado Postal 70-172,
04510 Mexico, D. F., Mexico

Dr Carlos Rius, IOCD Assistant Director, in his laboratory at UNAM, Mexico City.

IOCD Services

Analytical Service Centers,
Coordinator: Dr Carlos Rius,
(address: see above).

Biological Screening Service,
Coordinator: Prof. Lester A. Mitscher,
Department of Medical Chemistry,
School of Pharmacy,
University of Kansas, Lawrence,
Kansas 66045-2506, USA.

Working Group on Tropical Diseases

Chairman: Prof. Sydney Archer, Department of Chemistry, Rensselaer Polytechnic Institute, Troy, New York, USA.

According to the World Health Organization (WHO), nearly 3 billion people live in areas where there exists a risk of malaria. There are some 18 million cases of onchocerciasis (river blindness) and about 90 million cases of lymphatic forms of filariasis. Together, onchocerciasis and lymphatic filariasis are prevalent worldwide in an area inhabited by around 3.3 billion people. The number of cases of leishmaniasis in the world is unknown, but it is certain, according to WHO reports, that at least 40,000 new cases occur each year.

The IOCD Working Group on Tropical Diseases is concentrating its efforts on parasitic diseases, including malaria, filariasis, trypanosomiasis and leishmaniasis. *(Photo courtesy OXFAM.)*

Statistics of this kind support the decision of the IOCD Working Group on Tropical Diseases to concentrate its efforts principally on parasitic diseases, including malaria, filariasis, trypanosomiasis and leishmaniasis. Its programme of synthesizing new compounds for the treatment of parasitic and tropical diseases recognizes that the need for chemotherapeutic agents is constant and will grow in importance as more drug-resistant organisms evolve. At this point, chemical laboratories located in Brazil, Bulgaria, France, India, Iran, Mexico, Singpore, Sri Lanka, Thailand, UK, USA, Uraguay and Venezuela are involved in the synthesis of new agents for the treatment of tropical diseases. IOCD realizes that the search for solutions to these problems may be long, but the objective is well defined.

An agreement has been reached with the WHO in Geneva and the Walter Reed Army Institute of Research in Washington for the biological testing of new compounds obtained in the IOCD programme.

Over 130 compounds have been obtained by synthesis by IOCD chemists and 117 have been tested *in vivo*. *(Photo courtesy WHO.)*

An agreement has also been signed with WHO which ensures that promising leads from the IOCD synthetic programme will be submitted to toxicological and clinical studies.

At this stage, over 130 compounds have been obtained by synthesis by IOCD chemists and 117 have been tested *in vivo*. Several are showing promising results in the treatment of *Trypanosoma cruzi* (Chagas disease) and another substance proved to give over 80% remission in confirmed assays against filariasis, thus showing that IOCD has access to adequate synthetic capabilities.

Working Group on Fertility Regulation

Chairman: Prof. Josef Fried, Department of Chemistry, The University of Chicago, Chicago, Illinois, USA.

This working group is carrying out research on the chemistry and mechanisms of action of new antifertility agents in the male. At present, two classes of compounds are under investigation.

Biological Studies of Sulfonamides and Synthesis Programme of New Analogues

This study arose from the observation that sulfasalazine and the combination of sulfamethoxazole and trimethoprim, both widely prescribed medicinals, have been observed to cause changes in sperm morphology and reduction of fertility in the male. Sulfasalazine, while not itself an acceptable antifertility agent, has been in clinical use for 40 years, making it a promising lead for chemical modification.

More than 15 substances used in human therapy — antimicrobials, antidiabetics, hypotensives and carbonic anhydrase inhibitors — have been

submitted to a rat antifertility assay to pinpoint the structural, biochemical and therapeutic basis for the unexpected interference with male fertility. Some of the drugs are inhibitors of folate-requiring enzymes. Among the most potent compounds to interfere with male fertility are the dihydrofolate reductase inhibitor primethamine and the antibacterial and antiprotozoal drug dapsone (para-diaminodiphenyl-sulfone).

The discovery that the drugs pyrimethamine and dapsone could completely inhibit fertility in male rats is novel and entirely unexpected. IOCD scientists are now testing a combination of these two drugs and seeking to elucidate the mechanism of their action.

The recent finding that these drugs also cause sterility in the mouse means biological testing can now be done at 1/10th the levels necessary for rats. This reduces significantly the amount of material to be synthesized. IOCD scientists in Mexico and Hong Kong are preparing compounds related to sulfasalazine and pyrimethamine.

Synthesis of analogues of ketoconazole

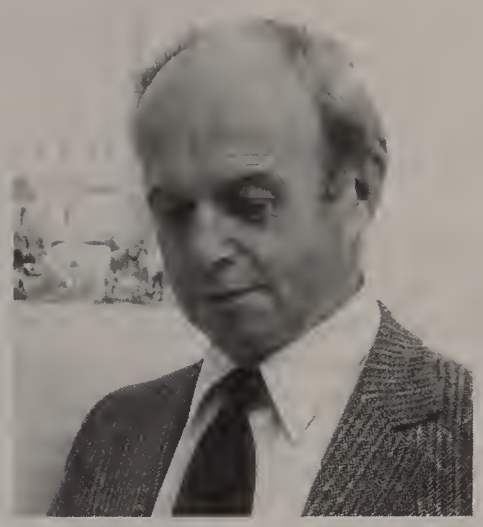
IOCD scientists are also synthesizing analogues of the antifungal drug ketoconazole, a powerful spermicidal agent, non-toxic to humans, but with the disadvantage of inhibiting the synthesis of testosterone in the gonads. Their objective is to prepare compounds free of this latter side-effect. Bioassay facilities are being set up in France, India and Thailand. Ketoconazole-related compounds synthesized in the IOCD antiparasite programme are being tested as spermicidal agents *in vitro*.

Working Group on Plant Chemistry

Chairman: Sir Leslie Fowden, Rothamsted Experimental Station, Harpenden, Hertfordshire, UK.

At its March 1988 meeting, the Executive Committee of the Council of IOCD agreed to establish the Working Group on Plant Chemistry. This initiative absorbed IOCD's earlier Agrochemistry Programme, maintaining the current impetus in IOCD investigations seeking to identify chemical constituents of plants having potential usefulness in agriculture whilst augmenting them with other studies on the active components of plants used in traditional herbal medicines important in the lives of many Third World people.

The programme recognizes that the varied and exotic flora existing in many developing countries represent most valuable resources, and that exciting opportunities exist to apply chemical expertise to define and exploit potentially interesting plant natural products. Folklore has recognized that selected plant species display physiological activities antagonistic to weeds, pests, insects,



Sir Leslie Fowden, chairman of the IOCD Working Group on Plant Chemistry.

pathogenic fungi and perhaps viruses affecting plant growth; many other plants have found a place in tribal or "alternative" medicines on the basis of claims that they can arrest or reverse symptoms of many human diseases.

The thrust of the plant chemistry programme is to link the experience and facilities of chemists and biologists in developed countries with the investigations of colleagues working in laboratories in developing countries seeking to extract and chemically characterize interesting plant products from species within the local flora known to possess active compounds. After structural identification, active compounds may be developed for local use providing more exact and robust materials for use in crop protection or medicine than those available from dried plant material or crude extracts; alternatively, but admittedly as a long-shot, new lead structures of interest to the agrochemical or pharmaceutical industries might be evident.

The IOCD plant chemistry programme aims to extract and chemically characterize interesting plant products from species within the local flora known to possess active compounds. ***(Photo courtesy ILO.)***

The present experimental programme, based mainly on the previous Agrochemical Programme, is located at several centres in Mexico; chemists in several other Latin American countries, already associated with IOCD, are likely to become affiliated with the new plant chemistry programme.

Laboratories in Canada, USA and UK collaborate with the Latin American chemists by providing, on request as necessary, sophisticated analytical facilities (including mass spectroscopy, magnetic resonance spectroscopy, and X-ray crystallography) and biological assays (for insecticidal, herbicidal, fungicidal and insect antifeedant activities). Screening for biological activity should ideally accompany the chemical fractionation of plant extracts, and IOCD is providing advice and encouragement that will hopefully lead to the successful implementation of a simple brine shrimp toxicity assay in the laboratories of plant chemists in Mexico.

IOCD is making efforts to broaden the current programme, in both its scientific and geographical bases. IOCD has been receiving a steady stream of inquiries from plant chemists working in countries of the Third World, often in the field of pharmocognosy, concerning possibilities of affiliating with IOCD's programme. There is also the opportunity to develop studies of pheromones of insects known to be important agricultural pests in Third World countries, and to use these novel compounds in alternative insect control strategies. The working group evaluates these inquiries in the effort to define and initiate a strong collaborative and mutually beneficial programme that will serve to lessen the frequent feeling of scientific isolation experienced by emergent scientists of developing countries.

Commission & Committee News

Database of IUPAC recommendations

The Committee on Chemical Databases met at the 35th General Assembly in Lund, Sweden, from 9 to 12 August 1989. One of the highlights of the CCDB meeting was the testing of the prototype version of a database of IUPAC recommendations which have appeared in *PAC* over the past 30 years.

This database is being developed by Prof. Dharam Vir Jain (India) of the Publications Committee. When this project is completed, it will be possible for any IUPAC member with an IBM-compatible PC to search for any IUPAC recommendation. The database and search software will be made available at a nominal cost.

CCDB held a number of meetings with various commissions to discuss possible databases, including conductance data, solubility data, stability constants, and thermodynamic properties of elements. Work on these is proceeding well and further announcements of their development are expected in the near future.

Lastly, the contract between Blackwell Scientific Publications and IUPAC for distribution of the first IUPAC PC computer, database was signed. Distribution of this diskette, ENTVAPOR (data on the enthalpy of vaporization of organic compounds), will begin shortly.

Stephen R. Heller

CHEMRAWN

IUPAC sponsors about 30 conferences throughout the world each year. Amongst the most successful are the CHEMRAWN conferences: CHEMical Research Applied to World Needs.

The success of a CHEMRAWN Conference is critically dependant on attracting the right person to the general chairmanship. After a long search, the CHEMRAWN Committee was rewarded by the acceptance of Prof. Walter Orr Roberts who agreed to undertake the task of General Chairman for CHEMRAWN VII — Chemistry and the Atmosphere: Its Impact on Global Change. This conference will be held in Baltimore, USA, in May 1991.

Walter Orr Roberts is the founder and President Emeritus of the University Corporation for Atmospheric Research (UCAR) at Boulder, Colorado. This is the umbrella organization that oversees the participation of some 30 universities in the research operation of the National Center for Atmospheric Research at the University of Colorado. Throughout his professional life he has been continually involved in atmospheric research. This involvement has won him numerous medals and international awards.

At its meeting in Lund, the CHEMRAWN Committee worked closely with Dr Jack Calvert (chairman) and Prof. Harold Schiff of the Commission on Atmospheric Chemistry. This commission

CHEMRAWN Committee chairman John Thomas (left) and secretary Bob Marchessault (right).

has the major responsibility for defining the programme and identifying the plenary lecturers for CHEMRAWN VII. Similarly, the relation to COCI (Committee on Chemistry and Industry) is ongoing through our support and participation in the 1st IUPAC Workshop on Safety in Chemical Production. This will be held in Basel, Switzerland in September 1990.

CHEMRAWN Committee welcomes the Bureau's initiative which encourages interdivisional collaboration. The committee is planning a stronger interaction with the Committee on Teaching in Chemistry.

On the other tentative conferences mentioned by chairman, Prof. John Thomas in his report, the committee is happy to announce that the 2nd World Conference on Chemistry and World Food Supplies is moving forward. Also, a Poland–USSR sponsored CHEMRAWN conference on ecological problems related to industrial wastes is being planned.

The next meeting of the CHEMRAWN Committee will be held in Warsaw, Poland, on 3–4 May 1990.

Bob Marchessault

LUND

Resource material for teachers

The role of divisional representatives on the Chemistry Teaching Committee (CTC) was discussed at length at the CTC meeting in Lund. The committee decided to initiate collaborative programmes with divisions/commissions for the preparation of teaching-oriented resource material in chemistry with particular emphasis on newly emerging areas. The three choices which are being examined are:

- a monograph on solid-state chemistry in collaboration with the Commission on High Temperature and Solid State Chemistry;
- a set of experiments on photochemistry developed by the Commission on Photochemistry;
- a booklet on "Uncertainties in measurement" in association with the Physical Chemistry Division.

The low-cost equipment project has continued to make progress. CIFEC, Montpellier, France, has developed several pieces of prototype and microscale apparatus. They have also held several teacher-

CTC Publications

The following items have been published by CTC:

- *International Newsletter on Chemical Education*. No. 29. This is a special issue on safety in schools (see *CI*, Vol. 11, No. 3, pp. 102–3, 1989).
- *International Newsletter on Chemical Education*. No. 30. This issue is devoted to microcomputers in tertiary chemical education (see *CI*, Vol. 11, No. 6, pp. 239–40, 1989).

Copies of the newsletter may be obtained from: Mr P. J. Towse, Centre for Studies in Science and Mathematics Education, University of Leeds, Leeds LS2 9JT, UK.

- *Locally produced low cost equipment and experiments for chemistry teaching* has been published by CTC in association with UNESCO.

Copies of this publication may be obtained from Prof. K. V. Sané, Department of Chemistry, University of Delhi, Delhi 110007, India.

CTC members: (left) Marjorie Gardner (University of California, USA); Maurice Chastrette, chairman (Université Claude-Bernard, Lyon, France) and (right) David Samuel (Weizmann Institute of Science, Israel).

training and curriculum evaluation workshops in French speaking countries.

The Delhi University Centre has set up a production unit, manned by teachers and students, for manufacture of equipment designed by the Delhi group. About 1000 instruments made by the centre are in use in student laboratories.

A set of 20 experiments dealing with water analysis and soil analysis has been developed as part of the CTC programme on "Experiments in environmental chemistry".

A CTC-sponsored symposium will be held in Moscow, USSR, from 29 to 31 August 1990. CTC also collaborated with UNESCO on the organization of an International Workshop on Integration of Topics Related to Energy and the Environment into Chemistry Teaching held in Berkeley, California, USA, 3–8 December 1989.

The next CTC meeting will be held in Moscow, 1–2 September 1990.

Krishna Sané

Chemisorbed species and van der Waals molecules

At its Lund meeting, the Commission on Molecular Structure and Spectroscopy (I.5) heard that major progress had been made on the project on "Secondary standards for intensity measurements in infrared spectroscopy". The commission approved a 2-year extension of the project so that a round robin test of the standards can be conducted in various laboratories.

A final document on the specifications for the publication of *NMR data in computerized data banks* was reviewed and approved — with minor additions suggested by commission members. The document will be sent to the Interdivisional Committee on Nomenclature and Symbols (IDCNS).

The first drafts of documents on 'Secondary wavenumber standards for high resolution infrared spectroscopy' and on 'Notations and conventions in molecular spectroscopy, Part 4 — Vibrational notation' were reviewed and comments made. These two projects should be completed by the next commission meeting.

Three documents are in press for *PAC* and the summaries of five documents will appear soon in *CI*.

A lively discussion of the "hot spots" in physical chemistry was held and, as a result, the commission initiated new projects on a data compendium of chemisorbed species on catalysts and electrodes by spectroscopic methods and on structure and properties of van der Waals molecules.

A study committee on quantum chemistry was

Commission I.5 members Jim Durig (chairman, right) and Ron Brown (centre) in conversation with Ian Mills (Commission I.1, left) at Lund.

suggested — probably at the division level — but with members from Commission I.5 (R. D. Brown and E. Hirota). Several names were proposed for the Working Group on Biophysical Chemistry.

Two additional new projects were initiated on symbols for fine and hyperfine structure constants and on specifications for handling and transfer of generic spectroscopic data in computerized format.

Jeanette G. Grasselli

LUND

Inorganic Chemistry Division

The Inorganic Chemistry Division Committee met at Lund on 9, 10, 13 and 14th August. On the first day of the meeting, after approval of the minutes, the Division President, Prof. Ekkehard Fluck, summarized developments within the Union since 1987 and noted some of the decisions required to be taken by the Division Committee at the Lund Assembly. Restructuring of IUPAC was discussed briefly.

Prof. Geoff Leigh at Lund.

The division secretary, Prof. Geoff Leigh, explained the situation concerning the division president's term of office and the division committee elections. The committee then received reports from Prof. Daryle Busch on behalf of the Commission on Nomenclature of Inorganic Chemistry (II.2) and Prof. Paul De Bièvre on behalf of the Working Party on Isotope Specific Measurements as References for Toxic/Essential Element Assay. *Inter Alia*, the publication of the forthcoming new edition of *Nomenclature of inorganic chemistry* at the end of 1989 was announced.

On the second day (an open meeting), the status of the division committee elections was discussed — after an introduction by Prof. Fluck. After extensive ventilation of the problems, the meeting passed four motions, affording support to the division officers and their actions.

The meeting received four short reports from the chairmen of the Commissions on Atomic Weight and Isotopic Abundances (II.1), Nomenclature of Inorganic Chemistry (II.2) and High Temperature and Solid State Chemistry (III.3). It also received a report from the chairman of the Division Working Party on Isotope Specific Measurements. After closure of the meeting, a reception was provided for members of the division by the Gmelin Institute of the Max-Planck-Gesellschaft, Frankfurt.

On 13th August, the Teasurer of the Union, Prof. Anders Björkman, described the financial problems now faced with the fall of the US dollar and indicated that changes will occur in the manner of funding of the divisions. The committee received a short report on the activities of the Commission on Radiochemistry and Nuclear Techniques (V.7) and then expressed its complete confidence in the division president in the matter of division elections.

The committee noted that the Working Party on Measurements, Sensors, and Measuring Instruments was to be dissolved and decided to explore the feasibility of a project on bio-inorganic chemistry. The committee also selected division representatives to the Committee on Teaching of Chemistry, the Interdivisional Committee on Nomenclature and Symbols and the boards of *CI* and *PAC*.

On the final day, 14th August, there was a short meeting devoted to finalizing the list of membership of the Division Committee and arranging Executive Committee meetings between the Lund and 36th IUPAC General Assembly.

Geoff Leigh

Revised table of atomic weights

The Commission on Atomic Weights and Isotopic Abundances (II.1), which met at Lund during the 35th IUPAC General Assembly, has revised its table of atomic weights. The data of three elements have been changed.

Due to new calibrated measurements the atomic weight of nickel was changed from 58.69(1) to 58.6934(2) and that of antimony from 121.73(3) to 121.757(3). Because the measurement of the isotopic composition of mercury has also been improved during the last two years, the commission was able to reduce the uncertainty of the atomic weight of this element from 200.59(3) to 200.59(2), respectively. Due to the nearly constant isotopic composition of protactinium in nature, where ^{231}Pa is the predominant isotope, the atomic weight of this element was fixed to 231.03588(2).

During the week before the Lund meeting the following subcommittees and working parties of the

Members of Commission II.1 at Lund.

commission met at the Central Bureau for Nuclear Measurements of the European Communities in Geel, Belgium, to discuss new data and strategic positions in the respective fields: Subcommittee for Isocopic Abundance Measurements, Working Party on Natural Isotopic Fractionation and Working Party on Non-Terrestrial Isotopic Abundance Data. The commission's Working Party on the Five Figure Table for Atomic Weights arranged a meeting during the General Assembly in Lund.

The chairman of the Subcommittee for Isotopic Abundance Measurements, Dr Linus L. Barnes from the National Institute of Standards and Technology in Gaithersburg, USA, gave a detailed element by element report to the subcommittee about new measurements of the isotopic composition. This was the last report in his function as a commission member after 14 years of intensive and excellent work. As a result of a detailed discussion it was decided that a new table of the 'Isotopic Composition of the Elements 1989' will be published in 1990. The last table of the isotopic composition was published in 1984 in *PAC*. The subcommittee will continue its work under the new chairmanship of Dr K. J. R. Rosman from the Curtin University of Technology in Perth, Australia.

The commission also considered the report of the Working Party on Natural Isotopic Fractionation and agreed that this group should continue its study of the limitations on atomic weights imposed by natural fractionation processes. Until the next meeting it is planned to establish comprehensive reviews of measured isotopic fractionations in nature for different elements, such as H, Li, B, C, N, O, S, and U.

The Working Party on Non-Terrestrial Isotopic Abundances presented a detailed report on non-terrestrial data to the commission. It was decided that this excellent review will be included in the commission's report and that the work of this working party should be continued.

A revised form of the Five Figure Table of Atomic Weights was presented by a working party, which had been set up during the Boston meeting in 1987. The five figure table will be published in the commission's report, the working party thus having completed its work.

The commission has also been involved in the working parties of the Inorganic Chemistry Division on 'Measurements, Sensors and Measuring Instruments' and on 'Isotope Specific Measurements as References for Toxic/Essential Element Essay'. Although the first-mentioned working party finished its work, the commission will continue to keep this topic in view. Due to its excellent work and to the great importance of isotope specific measurements and of isotope-dilution mass spectrometry for reference materials, the second working party became a new commission at Lund. Because a considerable expertise in this field could also be found among the members of Commission II.1 it was agreed that a close contact should be held between both commissions.

The next commission meeting will be held in the Federal Republic of Germany in 1991 during the 36th General Assembly.

Klaus G. Heumann

LUND

Organic Chemistry Division Committee

The IUPAC-sponsored purpose of interfacing chemistry with biological sciences is being achieved at several levels within the Organic Chemistry Division (III). Recent (Kyoto) and projected (New Delhi) symposia in the divisional series on natural product chemistry have included sessions on bio-organic chemistry.

The symposia on organometallic chemistry for organic synthesis, carbohydrates, carotenoids, and

heterocyclic chemistry have an obvious and increasing emphasis on biological processes and on biologically active entities.

Nelson Leonard, secretary of the Organic Chemistry Division Committee.

The Organic Chemistry Division Committee is in the planning process for arranging a sequel to the first and successful symposium on bio-organic chemistry, and a steering committee was authorized, under the chairmanship of Prof. Nelson Leonard, to determine how the division can assist further on the subsidiary goal of the interfacing of organic chemistry with the biological sciences.

The current wave of interest and activity in electron-transfer processes has provided impetus to the Commission on Photochemistry (III.3) to adopt as a project the extension of the well-received *Glossary of terms used in photochemistry* to serve the area of electron-transfer photochemistry, photoelectrochemistry, and photosynthesis.

A second project seeks to provide reference compounds for absorption coefficients of transients other than triplets that is, even shorter-lived intermediates than triplet species. The project is induced by the great advances in laser and computer technology which make the experiments possible and standards necessary. The proposed completion year for both projects is 1993 and publication of the reports in *PAC* is anticipated.

The parameters of structure–activity relationships (correlation analysis) are being used increasingly in chemistry, including medicinal chemistry along with computer modelling. A project report is expected in 1991 from the Commission on Physical Organic Chemistry (III.2) for recommendations on the critical assessment of correlation analysis.

The efforts of the Commission on Nomenclature of Organic Chemistry (III.1) continue to be directed towards the simplification of names and the establishment of principles that will be compatible with unique solutions to nomenclature, as demanded by computerization. Following discussions, President Sukh Dev requested that a joint organic–inorganic working party, co-ordinated with the Committee on Chemical Databases, be established by Commission III.1 chairman Peter Smith for the examination of applications of computers to nomenclature.

The Organic Chemistry Division business also included the usual report of previous meetings, of the president, and on divisional and commission activities. Election of officers and members of the committee, approval of memberships on the commissions, consideration of the budget, and discussion of means of positive publicity also took place.

Nelson Leonard

LUND

Structure–activity relationships to be reviewed

Expert opinions related in the report from a feasibility study conducted by Prof. Y. Takeuchi have prompted the Commission on Physical Organic Chemistry (III.2) to approve the formation of a Working Party on Structure–Activity Parameters and Relationships to be chaired by Profs J. Shorter and Y. Takeuchi. The objectives of this effort include guidance in appropriate uses of the numerous structure–activity relationships and their parameters that have recently become available.

The commission has confirmed its decision to initiate efforts to produce a second edition of the *Glossary of terms used in physical organic chemistry,* complete with the addition of appropriate new terms and revisions of existing terms and with potential additions of stereo-chemical terminology, mechanistics terminology (see *PAC,* Vol. 61, No. 1, pp. 23–56, 1989), and nomenclature for organic chemical transformations (see *PAC,* Vol. 61, No. 4, pop. 725–768, 1989) in a revised compendium.

Feasibility studies were approved to investigate the possible development of bio-organic chemical terminology and terminology for instrumental methods in organic chemistry. A feasibility study for terminology in organometallic chemistry concluded that a separate effort was not necessary at this time and that appropriate terms could be added into the second edition of the glossary.

Ongoing work of the commission is focusing on the finalization of the *Guidelines for publication of research in experimental organic chemistry* (Prof. W. Drenth) and of the *Guidelines for the presentation of quantum mechanical computational data in organic chemistry* (Profs E. A. Halevi and T. Albright) following comments received by expert reviews.

Members of the Commission on Physical Organic Chemistry at Lund.

'Class names for reaction intermediates in organic chemistry' (Prof. P. Müller), a project nearing completion by Commission III.2, will be merged with a larger effort on "Class names", initiated in Commission III.1 and also nearing completion.

The next commission meeting will be held in Haifa, Israel, 10–12 August 1990 in conjunction with the 10th IUPAC Conference on Physical Organic Chemistry.

Michael P. Doyle

LUND

Industry plus academy produce results

The work of the Commission on Polymer Characterization and Properties (IV.2) is both experimental and theoretical and done by members of its working parties in their own laboratories. It is planned and discussed together with analysis of the considerable volume of results at regular meetings of the working parties and reviewed by the commission to identify synergy and to co-ordinate activities at annual meetings.

An exceptional breadth of international involvement is shown by the membership of the working parties, with a high level of industrial contribution. At its meeting in Lund, the commission identified a strong need to publicize this and the high level of activity and results in the areas it supports.

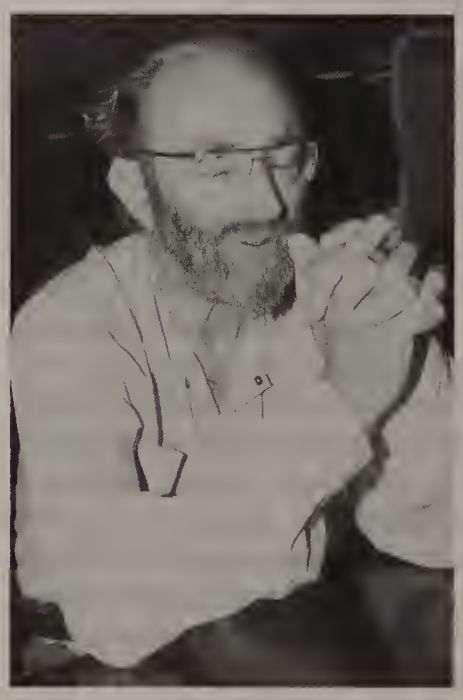
Both of the oldest working parties exemplify this breadth and volume of work and the worldwide co-operation that generates it. The Working Party on Structure and Properties of Commercial Polymers have regularly produced detailed technical reports during the last two decades. Now, with a large group working in East Asia and a smaller one in East Europe — both fully part of the total programme, the volume is increasing.

A major project since 1985 has been the study of the intrinsic toughness, stiffness, anisotropy, morphology and fatigue strength of fibre-reinforced thermoplastic composites. Four papers on this topic are to be published in 1990 in *PAC*.

Besides this and other such work on mechanical properties, there are projects running on rheological and processing properties. One such major project nearing completion is on polyblends and polyalloys. Many others are being planned, such as rubber toughening, injection moulding of liquid crystalline polymers, the rheology of long fibre-reinforced thermoplastics and polymer mixtures.

The Working Party on Molecular Characterization of Commercial Polymers also has members from both industry and academia from across the world, representation from academia being somewhat low but increasing. It has recently published a paper on Long and short chain branching frequency in low density polyethylene after some 4 years work in the area by a range of the members' laboratories.

An even larger and more long-term study of the molecular characterization of linear low density



Moment of reflection for John Cann, secretary of Commission IV.2, during the Lund meeting.

polyethylene has been completed and analysis and reporting is underway. Several new projects are being planned.

There is rapid and exciting development of the newer working parties. These are already engaged in significant practical and theoretical work, and have attracted large active memberships, again internationally spread. Many of these are concerned with topics of high present interest and are able to hold their meetings alongside international conferences and other meetings.

The Working Party on Interactions of Polymers with Living Systems is now well established and flourishing. The Working Parties on Polymer Liquid Crystals, Modelling of Polymerization Kinetics and Processes, and Polymer Networks are growing fast and generating a large number of sound active projects, well supported by their members.

The next commission meeting will be held in Montreal, Canada on 8th July 1990, before the 33rd International Symposium on Macromolecules (MACRO 90).

John M. Cann

Analytical Chemistry Division creates two Limited Life Time Commissions

A major restructuring of the division has resulted in the creation of two Limited Life Time Commissions on "Chromatography and other Analytical Separations" and "Environmental Analytical Chemistry". The former Commissions on Analytical Reactions, Reagents and Separations (V.1) and Analytical Nomenclature (V.3) have been combined to form the Commission on General Aspects of Analytical Chemistry (V.1).

The IUPAC Executive Committee made available two extra (ordinary) memberships for the division committee for the period 1989–91 in order to attain a better balance of vacancies in the division. Thus, the number of members has been raised to 10, with only four co-opted members. In 2 years time, when four members have to leave, only two new ones will be elected and the old structure will be restored. B. Griepink, R. Kalvoda and D. Klockow are the new members, G. den Boef took over as president from G. Nancollas, who will stay on the committee as a co-opted member, G. Svehla was elected secretary.

Of the two existing division projects, the one on harmonization will be reported on separately. The *Multilingual dictionary* is still not finalized, but is in its latest stage of preparation.

The committee decided to support strongly the horizontal programme on "Environmental chemistry" within the Union and, through the new Limited Life Time Commission on Environmental Analytical Chemistry, even hopes to play a leading role in such a programme. Another horizontal programme on

Gyula Svehla, secretary of the Analytical Division Committee.

"Advanced materials" will receive input from the Commission on Microchemical Techniques and Trace Analysis (V.2).

An extensive discussion took place on the division's representation on and the aims of the Committee on Teaching of Chemistry (CTC). It was felt that IUPAC should not involve itself in publishing textbooks for educational purposes (such as for high schools, university freshmen and teachers), and that this opinion should be expressed in the IUPAC Bureau.

A thorough review of all commission activities was followed by meetings in the presence of old and new commission chairmen and secretaries. Existing and new projects were discussed in detail.

Visits by the incoming IUPAC President, Secretary General and Treasurer to these meetings allowed members a greater insight into general IUPAC policies and trends.

The Division Committee conducts its business mainly by correspondence: no further meetings are planned until the 36th General Assembly.

Gyula Svehla

Speciation in the environment by nuclear techniques

When the Commission on Radiochemistry and Nuclear Techniques (V.7) met at the Lund General Assembly, it devoted some time to a careful and lengthy discussion and review of its projects.

Two papers by Norman Holden on nuclear properties have been published, (*PAC* Vol. 71, No. 8, 1989).

The following five commission projects have been completed and are now in the review process.

- Half-lives of long-lived nuclides (N.E. Holden)
- Isotopic and nuclear analytical techniques in biological systems (K.S. Kasprzak, Editor)
- Information on training in radiochemistry and nuclear techniques (J.–P. Adloff)
- The use of radiation by industry (J. Foos)

- Facilities for the determination of very low levels of radioactivity (I. Zvara)

Eight new projects were started, some of the following are already in an advanced state.

- Radioactive migration in groundwaters: review of the behaviour of actinides (R.J. Ch. Hagemaun)
- Nomenclature for isotope, nuclear and radioanalytical chemistry (P. Karol). This report will contain more than 1000 entries
- Critical evaluation of spontaneous fission half-lives of ground state nuclides (N.E. Holden, D.C. Hoffman)
- Critical evaluation of total half-lives of selected radionuclides (N.E. Holden)
- Application of accelerator mass spectrometry in analysis of stable isotope tracers and trace elements (Y.–F. Liu)
- Review of differences in reaction rates of isotopes and isotopically substituted molecules, specifically hydrogen isotopes (E. Roth)
- Gas thermochromatography and volatilization techniques for separations in radioanalytical and nuclear chemistry (I. Zvara)
- Study of speciation in the environment by nuclear techniques (H.A. Das, J.P. Adloff, E. Steinnes, H. R. von Gunten)

A meeting of the members engaged in the new project on "Speciation in the environment by nuclear techniques" is scheduled for October 1990 in Petten, The Netherlands.

H.R. von Gunten

Automated solubility database

With 42 members in attendance at its meeting in Lund, the Commission on Solubility Data (V.8) reviewed its newly completed contract with Pergamon Press which, among other improved features, calls for a reduction in the price per volume of the *Solubility data series (SDS)*.

A new contract signed with the All-Union Copyright Agency of the USSR (VAAP) during this meeting arranges for easier participation by Soviet scientists in the work of the commission.

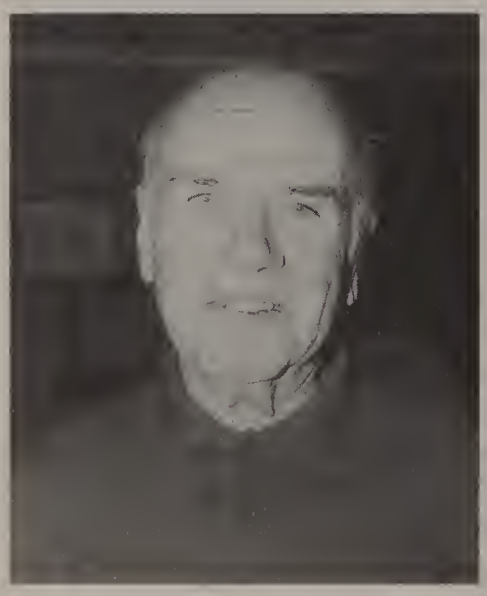
In 1989, the commission delivered six more *SDS* manuscripts to Pergamon Press for publication. The rate of volume production is on course and a number of manuscripts are already targeted for publication in 1990.

A very important advance in the production of an automated solubility database was made when the commission demonstrated a proposed version on diskette to the Committee on Chemical Databases. The data records displayed, using programs devised by Drs A. Maczynski, A. Skrzecz, Z. Maczyinska and J. Niedziela, were found to be consistent with the needs of automated database presentation, namely, easy access to the file and concise information display. It remains to tailor further the database to IUPAC and commission requirements, after which a diskette on solubilities of hydrocarbons in seawater will be produced.

A first circular announcing the 4th International Symposium on Solubility Phenomena (ISSP) has been issued and plans for the 5th symposium have progressed to the selection of a meeting site.

The next meeting of Commission V.8 will take place at the Rennsalaer Polytechnic Institute, Troy, New York, USA from 30 to 31 July, 1990, just prior to the 4th ISSP.

Lew Gevantman



Lew Gevantman is secretary of the Commission on Solubility.

LUND

Applied Chemistry Division strengthens its environmental role

New guidelines for the Applied Chemistry Division prepared by the new Division President, Dr Lewis Coles, were adopted when the division committee met in Lund. The new guidelines give the terms of reference of the division and the duties of corresponding members. The latter include attending their respective commission meetings whenever possible in order to develop better communications and establish closer working ties.

During the ACD presidency of Dr Helmut Frehse, a listing of all ACD project abstracts, known as the Blue Booklet, was prepared for monitoring projects. Unfortunately, this was not maintained. This book of project abstracts and ACD publications will be revised in time for the next ACD meeting.

The committee met with commission chairmen and secretaries early in the general assembly. This gave the committee a better overview of the

New member of the ACD Committee, Ludmilla Golovleva (left) and co-opted members Kurt Leichnitz (centre) and Helmut Frehse.

commissions activities and acquainted commission chairmen with any concerns the committee had regarding projects. In addition, by observing deadlines established for submitting commission membership lists and budgets, it facilitated an early review by the ACD committee.

Vital role of ACD

The committee welcomed the opportunity to meet with incoming President Yves Jeannin and discuss with him the future of IUPAC. Restructuring of IUPAC was deliberated and seen to involve closer interdivisional collaboration. The main topics of interest are (a) chemistry in the environment and (b) chemistry in the biosphere. This emphasis by IUPAC on environmental issues and the need for greater involvement with industry are of direct concern to ACD which plays a vital role in these areas.

At Lund, there were extensive changes in the membership of the division committee. In addition to four new members, Dr Coles took over from Dr Phil Kearney as ACD President. Dr Pieter Steyn became the new Vice-President of ACD.

The new corresponding members for ACD commissions are: Dr Steyn — Food Chemistry (VI.1); Dr Ludmilla Golovleva — Biotechnology (VI.2); Dr Joyce Beare-Rogers — Oils, Fats and Derivatives (VI.3); Mr Kurt Leichnitz — Atmospheric Chemistry (VI.4); Dr Frehse — Agrochemicals (VI.5); and Mr Ray Bates — Water Chemistry (VI.6). The role of co-ordinators in ACD is under review and none were appointed at this meeting.

Much criticism has been received from the commissions regarding the function of *PAC* and delays in publication. Reviews of reports by the International Committee on Nomenclature and Symbols (IDCNS) was explained in *CI,* Vol. 11, No. 2, pp. 65–68, 1989. However, the process of preparing ACD reports and their reviewing requires further clarification and attempts made to streamline the process.

Achievements of ACD commissions

In his division presidents' Report to Council, Dr Coles highlighted the achievements of ACD commissions. The Commission on Food Chemistry places great emphasis on food safety and has developed and validated several analytical procedures which have been adopted by international food labortories.

Through a series of seminars, the Commission on Biotechnology has developed some interdivisional collaboration and is now focusing on pharmaceutical applications. The Commission on Oils, Fats and Derivatives is the largest and most active in ACD. It is engaged on laboratory projects dealing with food safety and nutrition at the international level.

The Commission on Atmospheric Chemistry is involved in the organization of the CHEMRAWN VII Conference on Chemistry and the Atmosphere: its Impact on Global Change (Baltimore, USA, May 1991). Commission VI. 4 is also planning a major symposium on environmental issues including ozone depletion and the greenhouse effect.

Due to the large representation from industry in the Commission on Agrochemicals, it addressed problems directly related to the use of pesticides and their environmental impact. The commission initiated the first ACD "out-reach" programme in collaboration with the Chinese Chemical Society.

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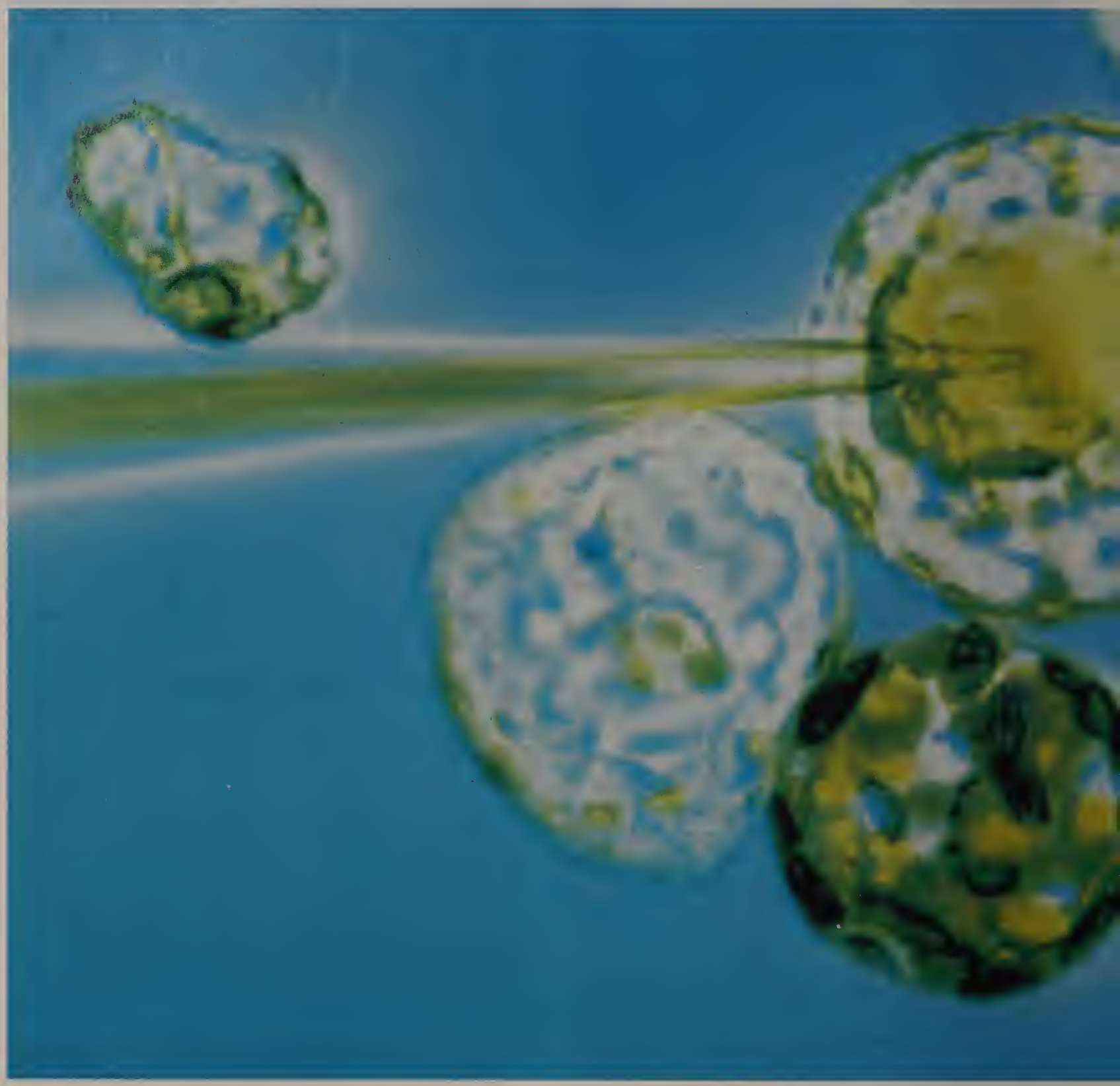

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Such programmes are intended to inform developing countries of the advances in technology. Finally, the Commission on Water Chemistry was restructured under a new chairman and has initiated a new programme aimed at environmental concerns. This includes plans for a workshop on the modelling of aquatic systems.

ACD plans to strengthen further its role in the environmental sciences. It considers that the Commissions on Agrochemicals, Atmospheric Chemistry, Biotechnology and Water Chemistry will play a central role in IUPAC's environmental activities. The task of the Commission on Atmospheric Chemistry in the organization of the next CHEMRAWN meeting is only the example. New "out-reach" projects are being planned by the Commissions on agrochemicals and Food Chemistry to help developing countries. Informing the public on environmental issues will be an important task for all commissions — especially so for the agrochemical, atmospheric and water chemistry commissions.

The next ACD Committee meeting will be held in Lubeck, FRG, 11–12 August, 1990.

Roy Greenhalgh

Commission on Food Chemistry: method studies on determination of Se, Na, K, Ca and Mg in foods and other biological materials.

Immunochemical assays used in monitoring food contaminants and components

When the Commission on Food Chemistry (VI.1) met at Lund, it received a report on the evaluation of chemical and immunochemical methods for monitoring food contaminants and components through interlaboratory studies. Several methods for aflatoxins have been the object of joint IUPAC/AOAC (Association of Official Analytical Chemists) studies.

The methods studied include enzyme-linked immunosorbent assays (ELISA) and affinity column screening assays for aflatoxins in corn cottonseed, peanut products, feeds, and liquid and thin layer chromatographic methods for aflatoxins B_1, B_2, G_1 and G_2 in corn and peanut products.

Other method studies focused on the determination of selenium, sodium, potassium, calcium and magnesium in foods and other biological materials. Methods for the determination of various forms of *N*-nitrosamines, ethylcarbamate and for chlorinated dibenzo-*p*-dioxin and furan isomers have also been studied. The commission is studying the reliability of using immunochemical-based methods for detecting residues in foods. In addition to aflatoxin studies refered to above, this methodology is being used for animal drug residues and aquatic biotoxins.

Current projects are developing guidelines for the assessment and quality control of immunochemical methods and procedures for determining precision parameters for these assays.

Out-reach projects were developed for Ghana and Thailand involving training programmes in mycotoxins and phycotoxins as well as a ruggedness test of an immunoassay for aflatoxin in Zambia.

The next meeting will be held in Vienna, Austria, 23–25 August 1990.

Douglas L. Park

Does the human genome concern IUPAC?

To help prepare for the Commission on Biotechnology (VI.2) open meeting scheduled for the IUPAC General Assembly in Lund, Commission chairman, Prof. Manfred Ringpfeil (GDR) invited several scientists to join a working party to discuss the consequences of projects to analyse the human genome regarding possible future involvement of IUPAC. The meeting took place in Berlin–Buch, GDR on 1st July 1989.

Prof. Charles Coutelle (GDR), a member of the Human Genome Organization (HUGO), gave a brief outline of the recent meeting of this organization held in Moscow 24–25 June, 1989. HUGO is a scientific organization, founded in 1988, which

co-ordinates the efforts of several countries to contribute to the molecular analysis of the human genome. It aims to co-ordinate research work, training courses, exchange of data and public debates on ethical and legal guidelines.

Dr André Rosenthal (GDR) emphasized the need for the development of a new generation of techniques for chemical DNA synthesis and DNA sequencing. Automated simultaneous DNA synthesis in the nanomolar range of up to 100 different oligo-nucleotides, or even more within a few hours, is urgently needed. Standards for unambiguous DNA sequence determination should be established.

DNA sequencing procedures have to be enhanced in the near future by a factor of at least 10^2 by introduction of effective, automated non-radioactive methods. One of the basic principles for reaching this goal is the use of fluorescent dyes for multiple sequencing.

Prof. Joachim Engels (FRG), an associate member of Commission VI.2, supported the need to consider the ethical and legal aspects of the genome analysis and to solve the problem of data exchange and individual data security.

Prof. Jens Reich (GDR) focused his attention on the problem of data processing. This has to account for the large size of the human genome of 3×10^9 base pairs and its high polymorphism. Presently, none of the existing databases is able to handle this problem. In this respect, standardization of software for data processing and data input is urgently needed.

In a lively discussion, in which Commission VI.2 associate member Prof. Bertram Nagel (GDR) participated, several problems arising from the reports were reviewed. Special attention was given to the problem of biological variability and analytical speed and accuracy.

Central Institute for Molecular Biology of the Academy of Sciences of the GDR where research on the human genome is being carried out.

Prof. Ringpfeil summarized the discussions and the participants agreed to bring to the attention of IUPAC the need for:

- standardization of quality control in DNA sequencing;
- unified terminology in data bank development for DNA sequences;
- recommendations for new generations of automated super micromethods in DNA chemistry, in particular for miniaturized multiple DNA synthesis and for non-radio active multiplex DNA sequencing based on the application of fluorescent dyes;
- discussion of the definition of an 'individual' DNA molecule in respect of the high polymorphic content.

The working party recommended that chemists at the Lund open meeting should discuss these points. This discussion was introduced by a lecture by Dr Rosenthal and chaired by Prof. Engels. Furthermore, the working party recommended that HUGO representatives should be approached in order to discuss future orientated projects important for the position of chemistry in human genome analysis.

Bertram Nagel

LUND

New directions in agrochemicals

Prof. N. Kurihara (Japan), Dr E. Dorn (FRG) and Dr G. Paulson (USA) were elected titular members of the Commission on Agrochemicals (VI.5) at its Lund meeting. Five new associate members were also elected. Dr Pat Holland (New Zealand) succeeded Dr Terry Roberts (UK) as secretary with Dr Richard Hemingway (UK) continuing as chairman. Twenty members, national representatives and observers attended a fruitful 4 day meeting at Lund.

The commission gave final approval for publication in *PAC* projects on microbial conversion of pesticides and on mass spectroscopy of pesticides. Two further projects on residue problems were completed and a further eight extensively discussed.

Planning for the 7th International Congress of Pesticide Chemistry, Hamburg, FRG, 5–10 August 1990, was reviewed. This congress will be a very large and stimulating event, covering all aspects of pesticide development and use.

A useful joint meeting was held with the Commission on Water Chemistry (VI.6) and proposals made to attend their planned workshop in Stockholm in September 1990.

Lund meeting of the Commission on Agrochemicals: Terry Roberts (left), Richard Hemingway and Pat Holland (right).

Overall participation in the meeting was enthusiastic and significant progress was made in projects of great importance to an increased understanding of pesticide chemistry.

The next commission meeting will be held in Bad Durkheim, FRG, 30 July to 3 August 1990.

Pat Holland

Standardization of antidepressant drug monitoring

The Commission on Toxicology (VII.4) is embarking on a series of ambitious, new projects which fulfil the new emphasis of IUPAC on chemical safety and biological consequences of exposure to toxic elements.

Commission on Toxicology chairman Philippe Grandjean (left) and secretary Rita Cornelis in Lund.

When it met in Lund, the commission considered suggestions for a new structure. It dissolved the four existing subcommittees and set up health-oriented working parties, each consisting of a chairman and a maximum of five co-workers.

A major study, under the guidance of Dr S. Wong, deals with the standardization of antidepressant drug monitoring. Dr R. Herber is in charge of the project "Standardization or proteins (B_2 microglobulines, retinol-binding protein and albumin) by radio immunoassay".

A very special venture is the project to put forward reference intervals for mercury and nickel in various body fluids. Last, but not least, the commission is preparing an "IUPAC glossary of terms in toxicology and ecotoxicology".

The commission is embarking on the project "Isotope — specific measurements as references for toxic essential element assay", chaired by Dr P. de Biévre. This is a joint project with the Inorganic Chemistry Division.

The commission has sponsored a number of important meetings during the past year which have resulted in the publication of proceedings. These initiatives will be continued during the coming year.

Members of the dissolved subcommittees will become corresponding members and thereby kept informed about commission activities. They are also warmly recommended to become affiliate members of IUPAC through their national adhering organizations.

The next commission meeting will be held in Helsinki, Finland, at the time of the International Symposium on Trace Elements in Health and Disease, 5–8 June 1990.

Rita Cornelis

LUND

Surface analysis terminology

The Subcommittee on Surface Analysis of the Commission on Microchemical Techniques and Trace Analysis (V.2) has initiated a project on terminology. The aim of the project is to compile and publish (in English) a comprehensive list of terms relating to auger electron spectroscopy.

Some time ago, surface analysis experts concluded that there is little agreement on the meaning of concepts within their field. New concepts come into being almost every day and in order for experts to be able to communicate scientific experiences not only to their colleagues, but also to the interested public, it is of the greatest importance that a scientific consensus is reached on these meanings.

Terminologist Helmi Sonneveld.

This is not an easy task. The project team therefore includes experts on surface analysis as well terminologists (from the terminology bureau TOPTERM).

The exchange of knowledge between chemists, physicists and linguists has already led to some fruitful results. One of the most important outcomes of this activity on terminology is the realization by surface analysis experts that concepts are often used without a clear understanding of their basic meaning or use. For example, who would like to attempt a definition of the concept "surface"? Terminologists can show experts how to systematize the knowledge of the subject field in order to overcome misunderstanding or even incomprehension between experts themselves and between experts and the general public.

For information on TOPTERM, or on terminology in general, please write to Dr K. K. Loening, TOPTERM North American Division, P.O. Box 21213, Columbus, Ohio 43221, USA.

Helmi Sonneveld

Provisional Recommendations

IUPAC seeks your comments

In this section we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *Pure and Applied Chemistry* and synopses of these published in *CI* as recent reports.

If you would like to comment on the provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the IUPAC Secretariat. The most up-to-date list of national/regional centres appeared in *CI,* Vol. 11, No. 2. p. 67, 1989.

A Guide to IUPAC Nomenclature of Organic Compounds

This guide is primarily a reorganization of the main principles of organic nomenclature as described in the 1979 edition of the IUPAC *Nomenclature of organic chemistry* (commonly known as the Blue Book), but it also includes new recommendations published since its appearance and some important unpublished changes.

This publication is the first of two parts of the next edition of the IUPAC recommendations on nomenclature for organic chemistry planned by the Commission on Nomenclature of Organic Chemistry (III.1). It presents limiting lists of traditional (trivial) and semi-systematic names retained for general use, reviews the different methods of nomenclature for organic compounds, and describes how to use them to generate alternative, yet unambiguous, names. The guide also describes the reverse process, that is, how to deduce a correct structure from its unambiguous name. Without eliminating other systematic names, this guide presents extensive examples of names preferred by Commission III.1, when other considerations do not determine a choice, but it does not attempt to be comprehensive in this respect, nor does it attempt to provide general principles for generating such preferred names. The latter is to be included in the second part of the new edition of IUPAC recommendations for nomenclature of organic compounds.

The guide covers the following subjects: (0) general conventions and a glossary; (1) general principles of organic nomenclature (including the new conventions for describing non-standard bonding numbers and the presence of non-cumulative double bonds in cyclic compounds); (2) parent hydrides and derived prefix names; (3) characteristic (or functional) groups; (4) a guide to name construction; (5) applications (of the general principles) to specific classes of compounds, including radicals and ions; (6) name interpretation;

(7) stereochemical specification; (8) isotopically modified compounds; and (9) an appendix, including the listing of trivial and semisystematic names retained for general use, names for groups bridging fused ring systems, and a listing of terms for use in replacement nomenclature.

The second part of new edition of the IUPAC recommendations for naming organic compounds, which will provide a self-consistent set of principles for selecting a unique IUPAC preferred name for any organic compound, is in preparation.

Comments on the guide should be sent by 31st October 1990 to: Mr E. W. Godly, 10 Laurence Avenue, New Malden, Surrey KT3 5LY, UK.

English-derived abbreviations for experimental techniques in surface science and chemical spectroscopy

Surface science and chemical spectroscopy have led, in the literature and in oral presentations, to the use of a large number of abbreviations for different experimental techniques. In some cases several different abbreviations have been used for the same technique and in many cases the abbreviations are understood by only a small part of the surface science/spectroscopy community. Such a situation causes particular difficulties in communication for those with interdisciplinary interests.

The present document suggests a systematic procedure for the generation of abbreviations which accords with many of those previously adopted. A survey is given of current principal abbreviations in these fields and recommendations are made which are either in accord with the systematic principles, or are so well-established that it would be unrealistic to suggest alternatives.

Comments on the guide should be sent by 31st October 1990 to: Prof. N. Sheppard, School of Chemical Sciences, University of East Anglia, Norwich NR4 7TJ, UK.

Manual on catalyst characterization

This *Manual on catalyst characterization* has been prepared as a result of the general feeling among surface and catalyst chemists from industry and academia that the rapid development of the understanding of the mechanism of catalytic processes and the spectacular expansion of highly sophisticated catalytic technologies has not been accompanied by the provision of the appropriate scientific language. Many terms which are widely used in the literature do not have precise scientific definitions.

Characterization of a catalytic system requires the description of the method of its preparation, specification of its physical properties, and detailed information on its structural and chemical characteristics.

A description of the catalytic properties must contain information on the rate of chemical change, on the product composition, and on the changes in the catalyst with time on stream due to poisoning, inhibition, fouling, sintering, or chemical reactions. The aim of this manual is to provide recommended definitions for the terms frequently encountered in catalytic research.

Comments on this manual should be sent by 31st October 1990 to Prof. J. Haber, Instytut Katalizy i Fizykochemii Powierzchni, Polska Akademia Nauk, ul. Niezapominajek, PL-30 239 Kraków, Poland.

PAC Review

Pure and Applied Chemistry (PAC) is IUPAC's official journal. It publishes the main invited lectures of symposia sponsored by the Union; the recommendations of its commissions on nomenclature, symbols and units and technical reports on standardization, recommended procedures, collaborative studies and data compilations. Summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports appearing in *PAC* are published in *CI* in the section *Recent Reports*. In this section we take a brief look at the symposia and lectures published in recent issues of *PAC*.

Thermal analysis and vapour-liquid equilibria

Thermal analysis

The 9th International Congress on Thermal Analysis was held in Jerusalem, Israel, August, 1988. The programme of the congress covered widely divergent disciplines ranging from mineralogy and inorganic chemistry to organic chemistry and polymers and from applied or industrial chemistry to theoretical studies.

The congress included plenary lectures, invited lectures, poster contributions and five workshops. The following five plenary lectures from the congress were published in the August, 1989 issue of *PAC*.

- Synthesis and real structure of inorganic materials (H-R. Oswald and A. Reller, University of Zürich, Switzerland)
- Synthesis and thermal properties of superconducting copper oxides (A. Reller, University of Zürich, Switzerland)
- Emission thermophotometry: principles, instrumentation and applications (W.W. Wndlandt, University of Houston, USA)
- The detection of conformational disorder by thermal analysis (B. Wunderlich, University of Tennessee, USA)
- Thermal analysis of polymers (T.R. Manley, Newcastle Polytechnic, UK)

Vapour-liquid equilibria

The International Project on Vapour-Liquid Equilibria in 1-Alkanol + n-Alkane Mixtures was initiated by the IUPAC Subcommittee on Thermodynamic Tables (now the Subcommittee on Thermodynamic Data) of the Commission on Thermodynamics in 1983 with Dr H.V. Kehiaian, then its chairman, as coordinator.

The purpose was to strengthen international cooperation for the production of "recommended data" which would be universally accepted by the scientific and technological communities. It was decided to concentrate initially on 1-alkanols and n-alkanes and to develop a set of recommended data on low-pressure vapour-liquid equilibrium and related properties for binary 1-alkanol + n-alkane mixtures. In order to realize this objective, groups have been set up to concentrate on the following individual properties.

- *Pure components:* Volumetric properties of gases; Orthobaric densities and compressibilities; Critical properties; Heat capacities; Vapour pressure; and enthalpy of vaporization.
- *Mixtures:* Vapour-liquid equilibria; Liquid-liquid equilibria; Excess heat capacities and enthalpies; Excess volumes; Activity coefficients at infinite dilution; and Solid-liquid equilibria.

In each case, initial compilation of a complete bibliography is followed by the selection of data to form the basis of a preliminary recommendation which is then subject to critical evaluation and consistency tests. Methods of correlation and prediction are applied only after careful evaluation.

A series of workshops was planned for participants to meet, to present papers and to discuss progress. The first workshop was held in Warsaw in 1984, with subsequent workshops in Paris in 1985 and Budapest in 1987. The programme of these meetings included: state-of-the-art reviews; communications of original work; working party reports and discussion on individual properties; and discussion of future activities, especially with regard to increased cooperation and coordination of efforts, and exchange of data.

IUPAC affiliate Andrzej Szafranski (Research Institute for Industrial Chemistry, Warsaw) was one of three authors of a paper on "Second virial coefficients of normal alkanes, linear 1-alkanols and their binaries" presented at the workshop in Thessaloniki. The other two authors were IUPAC affiliate C. Tsonopoulos (Exxon Research and Engineering Company, New Jersey, USA) and Chairman of the Subcommittee on Thermodynamic Data John Dymond (The University, Glasgow, UK).

In view of the industrial importance of these and related mixtures, it was decided to include a special session on applications in the fourth workshop, held in Thessaloniki in 1988. Both commercial and environmental aspects of these mixtures were covered in the talks and discussions, as well as their properties.

The plenary lectures were published in the August, 1989 issue of *PAC*. They cover industrial processes, the use of oxygenated hydrocarbons in reducing air pollution, recommendations for certain pure component properties, and the results of equations of state calculations and model calculations for both pure compound and mixtures properties.

Silica gel-bound aza-crowns

The September, 1989 issue of *PAC* is mainly devoted to publication of the invited main lectures presented at the 13th International Symposium on Macrocyclic Chemistry held in Hamburg, FRG, 4-8 September 1988.

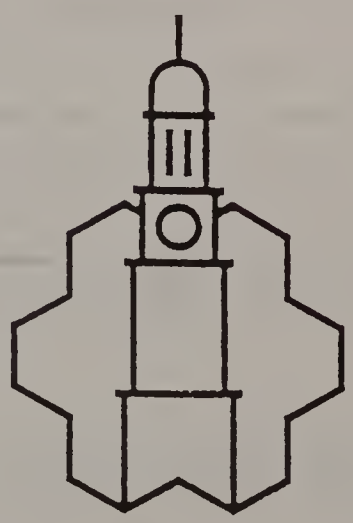
One paper entitled "Silica gel-bound aza-crowns for the selective removal and concentration of metal ions" was co-authored by IUPAC affiliate Reed T. Izatt, the late James J. Christensen and several other researchers from Brigham Young University, Utah, USA; School of Medicine, Lodz, Poland; and the Polytechnical University of Gdansk, Poland.

They reported that silica gel-bound macrocycles have been prepared by first hydrosilylating a macrocycle-containing alkene with triethoxysilane followed by coating and heating the resulting macrocycle-containing triethoxysilane on 60-200 mesh silica gel. The macrocycle is attached to silica gel by stable hydrocarbon-ether groups.

The aza-crown-containing alkenes were prepared in good overall yields by convenient three- and four-step reactions using *N*-[2-(2-chloroethoxy)ethyl] acetamide as a synthon. The silica gel-bound macrocycles were found to be stable at aqueous pH values below 11.

In numerous determinations, the log *K* values for the interaction of the bound-macrocycle with various cations were found to be similar to those for the analogous unbound macrocycle with the same cations in aqueous solution. This result indicated that the bound and unbound macrocycles are solvated and form complexes in the same manner. Several separations of heavy metal ions from aqueous mixtures of ions were described in the paper.

The 13th International Symposium on Macrocyclic Chemistry was one of a series of conferences initiated in 1977 through the efforts of Christensen, Izatt and their coworkers. Topics covered by the symposium were: molecular recognition and enzyme modelling; inorganic coordination chemistry; synthesis and structure; kinetics and thermodynamics; and analytical and synthetic applications.



The logo of the 13th symposium represents St Michael's Church, a landmark of Hamburg, as part of a closed macrocyclic structure.

Activation of alkynes with ruthenium complexes

Acetylenic derivatives are potentially useful starting materials for access to vinyl derivatives which are able to display specific properties. The direct addition to alkynes usually requires the activation of the carbon and carbon triple bond. Selected transition metal complexes can make this activation not only possible but also catalytic.

IUPAC affiliate Prof. Pierre Dixneuf (France) lectured on the activitation of alkynes at the Turin conference.

Examples of transformations of alkynes catalysed by transition metal complexes are now classical. More than 60 years after the discovery of nickel tetracarbonyl by Mond, this simple complex was found by Reppe to be an excellent catalyst precursor for the alcoxycarbonylation of alkynes and the formation of acrylic acids or esters. The key step of this reaction is the insertion of the carbon bond-carbon triple bond of the alkyne into the Ni bond-H bond resulting from the protonation of nickel(o) species.

More recently, new methods for the synthesis of furanones have been found by carbonylation of alkynes. The reaction is performed under water gas shift conditions, catalysed by rhodium carbonyl clusters and involves the insertion of the alkyne into an alkoxycarbonyl carbon-rhodium bond.

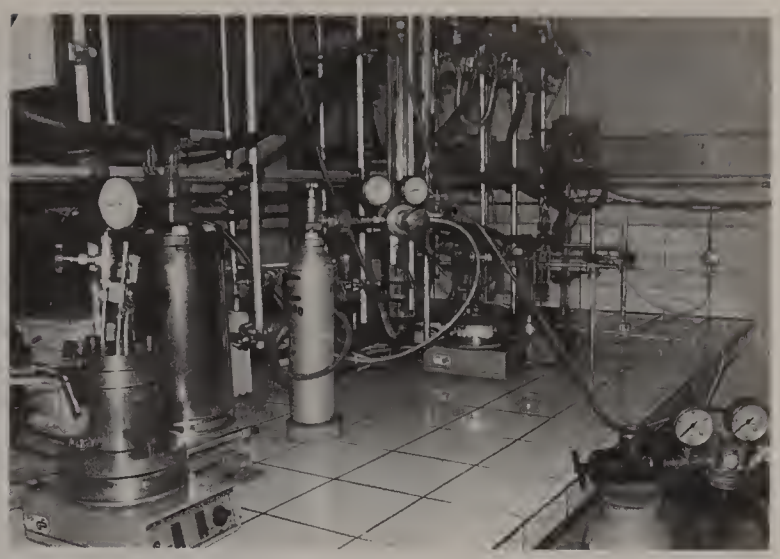
An important contribution to the synthesis of vinyl derivatives has appeared to be the cross-coupling reaction. The coupling of unsaturated halides with main group organometallic compounds is catalysed mainly by nickel(o) or palladium(o) complexes and leads to the regio- and stereoselective formation of carbon bond-carbon bonds. The determining step concerns the oxidative addition of the unsaturated hydrocarbon halide to the low-valent metal centre. This reaction has been used extensively for the synthesis of functional olefins. However, this type of cross-coupling reaction is not efficient for the formation of the

heteroatom bond-carbon bond in the synthesis of olefins.

IUPAC affiliate Pierre Dixneuf and his co-workers at the University of Rennes, France, have considered the possibility of producing functional olefinic compounds with a vinylcarbon bond-heteroatom bond simply by adding nucleophiles to activated alkynes.

Acetic acid is known to add to acetylene itself to produce vinyl acetate. The industrial process requires catalysis by Zn(II) salts between 170 and 250°C. It has been advantageously replaced by oxidative addition of acetic acid to ethylene catalysed by Pd(II) salts. These reactions are not extendable to higher carboxylic acids or amino acids and their drastic conditions do not allow the use of fragile optically active carboxylic acids such as amino acids.

The Dixneuf team has devoted itself to the search of catalytic conditions for the addition of carbamates and carboxylic acids to inexpensive alkynes. This programme led them to discover new catalytic syntheses of vinylcaramates, enol esters and β-oxopropyl esters and carbamates. The study of the interaction between terminal alkynes and arene ruthenium(II) complexes, the best catalyst precursors, led the chemists at Rennes to discover new carbene complexes and a new route to unsaturated metal carbene complexes.



Experiment on the activation of propyne in Prof. Dixneuf's laboratory, University of Rennes.

Dixneuf reported on these two aspects of the activation of alkynes (the catalytic syntheses and the formation of new metal carbene complexes with ruthenium derivatives) in a main session lecture at the 13th International Conference on Organometallic Chemistry held in Turin, Italy, September 1988. His lecture, entitled "Activation of alkynes with ruthenium complexes", and other main session and plenary lectures from the conference were published in the October 1989 issue of *PAC* (Vol. 61, No. 10).

Publications

Atmospheric chemistry: kinetic and photochemical data

A 216 page paper reporting work carried out under the auspices of the IUPAC Subcommittee on Gas Phase Kinetic Data Evaluation for Atmospheric Chemistry has recently been published. The paper updates and extends previous critical evaluations of the kinetics and photochemistry of gas phase chemical reactions of neutral species involved in atmospheric chemistry.

Data sheets were prepared for 360 thermal and photochemical reactions, containing summaries of the available experimental data with notes giving details of the experimental procedures. For each reaction, a preferred value of the rate coefficient at 298 K is given together with a temperature dependence where possible.

The selection of the preferred value is discussed; and estimates of the accuracies of the rate coefficients and temperature coefficients have been made for each reaction. The data sheets are intended to provide the basic physical chemical data needed as input for calculations which model atmospheric chemistry. A table summarizing the preferred rate data is provided, together with an appendix listing the available data on enthalpies of formation of the reactant and product species.

The paper, entitled "Evaluated kinetic and photochemical data for atmospheric chemistry: Supplement III" was published in *Journal of Physical and Chemical Reference Data,* Volume 18, No. 2, pp. 881-1087, 1989. The authors are R. Atkinson (University of Leeds, UK); R. A. Cox (Harwell Laboratory, UK), R. F. Hampson (National Institute of Standards and Technology, USA); J. A. Kerr (Chairman: Atmospheric Chemistry Group, EAWAG, Zürich, Switzerland) and J. Troe (University of Göttingen, FRG).

This paper is the third supplement to the original set of critically evaluated kinetic and photochemical rate parameters, for atmospheric chemistry,

Two of the authors of the report on evaluated atmospheric chemistry data: (left) Alistair Kerr (EAWAG, Switzerland), chairman of the IUPAC Subcommittee on Gas Phase Kinetic Data Evaluation for Atmospheric Chemistry and (right) Robert F. Hampson Jr (NIST, USA).

published by the International Council of Scientific Unions (ICSU) Committee on Data for Science and Technology (CODATA) Task Group on Gas phase Phase Chemical Kinetics in 1980 and subsequently updated by the first supplement in 1982 and the second supplement in 1984. The original evaluation and the first two supplements were primarily intended to furnish a kinetic data base for modeling middle atmospheric chemistry (10-55 km altitude).

In 1985, IUPAC set up a group to continue and enlarge upon the work initiated by CODATA. The Subcommittee on Gas Phase Kinetic Data Evaluation for Atmospheric Chemistry is chaired by J. A. Kerr and is part of the Commission on Chemical Kinetics (I.4).

With the publication of the present evaluation, this database has been updated and extended to include reactions involved in tropospheric chemistry. It is not possible to cope with all of the very large number of chemical reactions involved in tropospheric chemistry at this stage. A start has been made by selecting those organic reactions for which kinetic or photochemical data exist for species containing up to three carbon atoms. Future evaluations will add to this list.

A copy of this supplement (Reprint No. 366, Journal of Physical and Chemical Reference Data, *Vol. 18, No. 2, pp. 881-1097, 1989) may be ordered from the American Chemical Society, Distribution Office, 1155 Sixteenth Street; N. W. Washington, DC 20036-9976, USA. Price USD 18.00 plus (for foreign orders) USD 2.50 for postage and handling. Orders must be prepaid and checks made payable to the American Chemical Society.*

Chemistry of medicinal plants in Asia

These procedings, entitled *Progress in chemistry of medicinal plants in Asia,* contain the full texts of plenary lectures and section lectures presented at the 6th Asian Symposium on Medicinal Plants and Spices, Bandung, Indonesia, 24–28 January 1989.

There were seven plenary lectures: Biologically active oleanane-type triterpenes (S. Shibata); Three periods of natural products research in three continents during three decades (F. Sandberg); Rotenoid synthesis in the leguminosae (L. Crombie); Two dimensional NMR spectroscopy — principles and applications (Atta-ur-Rahman); Glucosinolates: occurence, origin, chemistry, function and significance (A. Kjaer); and Aspects of the biomimetic synthesis of antibiotics and their bioregulators (R. W. Rickards).

The section lectures were on the following themes: General natural products chemistry of medicinal plants: isolation, structure elucidation, synthesis and biosynthesis (20 papers); Pharmacology and pharmacognosy of medicinal plants (11 papers); Ethnopharmacology, biotechnology and agronomy of medicinal plants and essential oils (11 papers); Technology, information systems and policy on utilization of medicinal plants (5 papers).

Progress in chemistry of medicinal plants in Asia *is edited by S. A. Achmad, L. Makmur, F. Harjanto, E. H. Hakim and S. D. Djajanti. 1989. viii + 668 pp. Price USD 25.00 (including postage by surface mail). Orders with remittance should be sent to ASOMS VI Secretariat, Department of Chemistry, Institut Teknologi Bandung, Jalan Ganeca 10, Bandung 40132, Indonesia.*

How to make rhombohedra and octahedra from envelopes

The June 1989 issue of *International Newsletter on Chemical Education* (No. 31) contains articles on a broad range of topics. Dr M. Jemal describes initiatives in chemical education of the Chemical Society of Tunisia. Lydia Cascarini de Torre gives an account of the 1st International Argentinian Meeting on Methodology in the Teaching of Chemistry held at the University of San Luis.

Hans Bourma writes on the International Chemistry Olympiad movement as well as on the

International Chemistry Olympiad — one of the topics in the latest edition of *International Newsletter on Chemical Education*

production of inexpensive video tapes for schools in the Netherlands and the Dutch speaking part of Belgium. Andrew Hunt gives an account of the new work of the Science and Technology in Society Project at the 16-19 age level in the UK.

Shiguchi Yamana brings a touch of origami to the newsletter and turns used foolscap envelopes into rhombohedral and octahedral models with typical Japanese dexterity. From Greece, Emmanuel Gasparakis puts chemistry into a wider perspective. John Steward describes some curriculum developments in the Caribbean; and finally there is an account from Ram Lamba and Ramon de la Cuetara of low cost equipment production in Puerto Rico.

ISO Standards

The following are some of the new international standards announced by the International Organization for Standardization (ISO) in recent issues of *ISO Bulletin* (Nos 7–11, 1989). They are arranged in order of TC No.

Steel and iron — Determination of sulfur content — Infra-red absorption method after combustion in an induction furnace (TC 17. ISO 4935: 1989).

Chemical analysis of steel — Order of listing elements (TC 17. ISO/TR 6306: 1989).

Steel and iron — Determination of total carbon content — Infra-red absorption method after combustion in an induction furnace (TC 17. ISO 9556: 1989).

Steel and iron — Determination of vanadium content — Flame atomic absorption spectrometric method (TC 17. ISO 9647: 1989).

Petroleum products and hydrocarbon solvents — Determination of aniline point and mixed aniline point (TC 28. ISO 2977: 1989).

Lubricants, industrial oils and related products (class L) — Classification — Part 10: Family Y. Miscellaneous (TC 28. ISO 6743-10: 1989).

Petroleum products — Determination of total acid number — Semi-micro colour indicator titration method (TC 28. ISO 7537: 1989).

Animal and vegetable fats and oils — Determination of iodine value (TC 34. ISO 3961: 1989).

Animal and vegatable fats and oils — Preparation of test sample (TC 34. ISO 4223-1: 1989).

Sweetened condensed milk — Determination of total solids content. Reference method (TC 34. ISO 6734: 1989).

Natural rubber latex concentrate — Determination of dry rubber content (TC 45. ISO 126: 1989).

Rubber, raw natural — Specification (TC 45. ISO 2000: 1989).

Rubber — Synthetic lattices — Preparation of dry polymer (TC 45. ISO 2028. 1989).

Rubber or plastic-coated fabrics — Standard atmospheres for conditioning and testing (TC 45. ISO 2231: 1989).

Rubber or plastic-coated fabrices for water-resistant clothing — Specification — Part 2: Polyurethane and silicone elastomer-coated fabrics (TC 45. ISO 8096-2: 1989).

Rubber — Dissolution by acid digestion (TC 45. ISO 9028: 1989).

Plastics — Determination of ash — Part 5: Poly (vinyl chloride) (TC 61. 3451-5: 1989).

Plastics – Ethylene/vinyl acetate copolymer (E/VAC) thermoplastics — Determination of vinyl acetate content (TC 61. ISO 8985: 1989).

Manganese ores — Determination of moisture content (TC 65. ISO 4299: 1989).

Chromium ores — Increment sampling (TC 65. ISO 6153: 1989).

Chromium ores — Preparation of samples (TC 65. ISO 6154: 1989). Wrought aluminium and aluminium alloys — Chemical composition and forms of products. Part 1: Chemical composition; Part 2: Forms of products (TC 79. ISO 209-1,2: 1989).

Non-ionic surface active agents — Polyethyoxylated derivatives — Iodometric determination of oxyethylene groups (TC 91. ISO 2270: 1989).

Surface active agents — Soaps — Determination of low contents of free glycerol by molecular absorption spectrometry (TC 91. ISO 2272: 1989).

Surface active agents and soaps — Determination of water content — Azeotropic distillation method (TC 91. ISO 4318: 1989).

Surface active agents — Sulfated ethoxylated alcohols and alkylphenols — Determination of total active matter content (TC 91. ISO 6842: 1989).

Surface active agents — Technical alkane sulfonates — Determination of the mean relative molecular mass of the alkane monosulfonates and the alkane monosulfonate content (TC 91. ISO 6845: 1989).

Iron ores — Determination of acid-soluble iron(II) content — Titrimetric method (TC 102. ISO 9035: 1989).

Aluminium ores — Determination of the moisture content of bulk material (TC 129. ISO 9033: 1989).

Stationary source emissions — Determination of the mass concentration of sulfur dioxide — Hydrogen peroxide/barium perchlorate/Thorin method (TC 146. ISO 7934: 1989).

Ambient air — Determination of the mass concentration of sulfur dioxide — Hydrogen peroxide/barium perchlorate/Thorin method (TC 146. ISO 8136: 1989).

Air quality — Stratford sampling method for assessment of ambient air quality (TC 146, ISO 9359: 1989).

Water quality — Determination of biochemical oxygen demand after 5 days (BOD 5) — Dilution and seeding method (TC 147. ISO 5815: 1989).

Water quality — Vocabulary — Part (TC 147. ISO 6107-2: 1989).

Water quality — Determination of adsorbable organic halogens (AOX) (TC 147. ISO 6341-1: 1989).

Nickel and nickel alloys — Terms and definitions. Part 1. Materials; Part 2. Refinery products; Part 3: Wrought products and castings (TC 155. ISO 6372-1, 2, 3: 1989).

Nickel alloys — Determination of cobalt — Potentiometric method with potassium hexacyanoferrate (III) (TC 155. ISO 9389: 1989).

Natural gas — Determination of sulfur compounds. Part 1: General introduction; Part 3: Determination of hydrogen sulfide, mercaptan sulfur and carbonyl sulfide sulfur by potentiometry; Part 5: Lingener combustion method (TC 158. ISO 6326-1, 3, 5: 1989).

Fluorspar — Sampling and preparation (TC 175. ISO 8868: 1989).

Fluorspar — Determination of particle size distribution by sieving (TC 175. ISO 8876: 1989).

Solar energy — Water heating systems — Guide to material selection with regard to internal corrosion (TC 180. ISO/TR 10217: 1989).

ISO has also recently published a selective list of international standards on *Food technology*.

For further information about ISO and its publications apply to: International Organization for Standardization, Case postale 56, CH-1211 Genève 20, Switzerland. Tel: +41 (22) 34 12 40. Telex: 41 22 05 iso ch. Fax: +41 (22) 33 34 30.

KWIC index of international standards

The *KWIC index of international standards* is designed to provide a single comprehensive source for the identification of all international standards in a given field. Some 12 000 documents, produced by 29 international standardizing bodies, are listed in the 4th edition, using the "key-word in context" format.

The 4th edition of the index is published jointly by International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC). 1988. 714 pp. ISBN 92-67-10 152-8. Price CHF 96.-. To order please contact: ISO Central Secretariat, Case postale 56, CH-1211 Geneva 20, Switzerland.

Enzyme nomenclature

Supplement 2 (corrections and additions) to Enzyme Nomenclature — Recommendations 1984 prepared by the Nomenclature Committee of the International Union of Biochemistry (NC-IUB) has been published (*Eur. J. Biochem.* Vol. 179, pp. 489–533, 1989).

This document contains 275 entires for new enzymes which have come to light since the finalization of the 1984 editions at the end of November 1983 and the publication of Supplement 1 (*Eur. J. Biochem.* Vol. 157, pp. 1–26, 1986).

Carotenoids
Kyoto, Japan
20–25 May 1990

IUPAC SPONSORED

The following are the titles of the plenary lectures to be presented at the 9th International Symposium on Carotenoids to be held in Kyoto, Japan, 20–25 May 1990: Marine carotenoids — recent progress (S. L. Jensen, Norway); Some recent studies with retinal proteins (X. Nakanishi, USA); Recent advances in the synthesis of achiral carotenoids (K. Bernhard, Switzerland); Advances in the synthesis of optically active carotenoids (H.-P. Pfander, Switzerland); Transmembrane functions of carotenoids and analogues (G. Ourisson, France); Recent progress in carotenoid metabolism in animals (K. Schiedt, Switzerland); Recent progress in the medical applications of carotenoids (Mathews-Roth, USA); Recent progress in the field of commercial carotenoids and retinoids (J. Paust, FRG).

The conference language will be English. The registration fees are JPY 30 000 for active participants and JPY 15 000 for accompanying persons.

Mt. Hiei Hotel, Hieizan, Kyoto, venue of the 9th International Symposium on Carotenoids.

The weather in Kyoto is generally mild but can be changeable. Temperature varies between 15 and 20°C. Kyoto was the capital of Japan for more than centuries before Tokyo become the capital in 1868. The city is the cradle of Japanese culture and the spiritual home for all Japanese people.

For further information about the conference see *CI,* Vol. 12, No. 1, pp. 35–36, 1990, or write to the conference address given in the following *Conference Calendar.*

Ceramics
Montecatini, Italy
24–30 June 1990

IUPAC SPONSORED

The 7th CIMTEC-World Ceramics Congress will be held from 24 to 30 June 1990 at Montecatini Terme, a tourist resort near Florence, Tuscany. The congress will gather together ceramists and materials scientists and engineers as well experts from user areas.

The congress will consist of a general session open to all participants and two separate sessions on classical and high tech ceramics each consisting of several sessions.

Classical ceramics: 1. Materials science for classical ceramics; 2. Whitewares; 3. Structural building materials; 4. Refractory and thermal insulating materials; 5. Markets and product qualification.

High tech ceramics: 1. Fundamentals in materials research, processing science and technology; 2. Electric, magnetic and optical functions; 3. Chemical functions; 4. Mechanical and thermal functions; 5. Nuclear functions; 6. Markets for high tech ceramics: 7. Standards for high tech ceramics.

Four satellite symposia to the main congress will highlight topical aspects of the R&D currently pursued on selected fields which appear among the most significant within the technological framework of high tech ceramics. The satellite symposia topics are:

1. High performance ceramic films and coatings;
2. Advanced structural inorganic composites;
3. Ceramics in substitute and reconstructive surgery;
4. High temperature superconductors.

Applications involved range from the domestic, industrial and civil uses of classical ceramics to the many stimulation fields for introduction of high tech ceramics such as electrical engineering and electronics, telecommunications, high temperature engineering, mechanical engineering, coal gasification, nuclear fission and fusion, energy production, conversion, distribution and storage, metal cutting, biotechnology, space.

The scientific programme will consist of plenary lectures, invited sectional lectures, contributed lectures and poster presentations.

The official language of the congress and satellite symposia will be English. A simultaneous translation

Montecatini Congress Exhibition and Display Centre.

service in English, French, German and Italian will be provided for the "Classical ceramics" section.

The registration fee for the main congress will be about USD 400–500. IUPAC affiliates are entitled to a 10% reduction in the fee. The registration fee for each of the satellite symposia will be around USD 230–270. A cumulative reduced registration fee will be offered for participants attending both the main congress and the satellite symposia.

Social activities will include get-together parties, an official banquet, receptions and other special events.

The climate in Italy during June is pleasantly warm and moderately dry with an average daily temperature of 23–26°C and an average nightly temperature of 12–15°C.

Mechanisms of polymer strength and toughness

Prague, Czechoslovakia
16–19 July 1990

IUPAC SPONSORED

The 13th Discussion Conference on Mechanisms of Polymer Strength and Toughness will be held at the Institute of Macromolecular Chemistry, Prague. It is scheduled as one of the proposed Prague conferences devoted to polymer materials science.

The aim of the conference is to discuss different aspects of ultimate mechanical properties of polymers, mainly strength and toughness, in relation to the corresponding structural mechanisms. As macroscopic strength and toughness reflect several structural levels simultaneously, the conference programme will cover processes of various structural scales from molecular fracture and fracture emission phenomena to fracture mechanics and crack growth kinetics.

Contributions dealing with the early stages of fracture and contemporary methods monitoring crack initiation and subcritical crack growth will be particularly welcome. Practical problems of strength and toughness in real materials and balancing strength and toughness in polymer blends and composities will also be discussed.

The conference topics are:

- Molecular fracture and its role in fracture initiation. Inter-relations between fracture and degradation
- Effects of supermolecular structure, flaws and inclusions on crack initiation and propagation. Fracture processes in filled polymers and short fibre composites. Structure aspects of fracture mechanics
- The role of plasticity in the failure of polymers. Ductile–brittle transition. Cracking, crazing, shear banding and environmental effects
- Physical meaning of experimental scatter in strength and toughness. Reliability of polymeric materials. Strength and durability predictions.

The following scientists have agreed to present main lectures: N. Brown (Philadelphia, USA), J. T. Dickinson (Pullman, USA), G. Hinrichsen (Berlin, FRG), H. H. Kausch (Lausanne, Switzerland), P. J. Lemstra (Eindhoven, The Netherlands), G. Michler (Halle, GDR), I. Narisawa (Yonezawa, Japan), E. V. Prut (Moscow, USSR), V. A. Zakrevskii (Leningrad, USSR), P. Smith (Santa Barbara, USA), E. Zachariadis (San Jose, USA).

The registration fee will be approximately DEM 250 excluding accommodation — which will be available in halls of residence within easy reach of the institute by public transport.

Photochemistry

Warwick, UK
22–28 July 1990

IUPAC SPONSORED

The 13th IUPAC Symposium on Photochemistry will be held on the campus of the University of Warwick, UK, The campus is located in a scenic area south of the city of Coventry, an area known as the 'Heart of England'. Nearby are the towns of Warwick, Kenilworth, Royal Leamington Spa, and Stratford-upon-Avon, and the rural Cotswolds. Coventry is readily accessible by rail from London and from

The University of Warwick, venue of the 13th IUPAC Symposium on Photochemistry, July 1990. ***(Photo courtesy University of Warwick Library Photography Dept.)***

international airports in Birmingham, London and Manchester.

The modern campus of the University of Warwick provides excellent facilities for conferences and accompanying persons. All scientific sessions will be held in the centrally located Arts Centre. A range of accommodation (with or without private bath/shower) is located nearby as are banks, post office, travel agent, shops, pubs, and a full range of recreational facilities. The average temperatures are 20°C (day) and 15°C (night). Participants are advised to bring a sweater and waterproof coat in case of inclement weather.

The meeting will consist of 22 plenary lectures by scientists from 13 countries, short contributed lectures, and the Porter Medal Award Lecture. The lectures will cover a broad range of topics of current interest in photochemical science as well as innovative technologies based upon photochemistry. There will also be demonstrations of technologies and an exhibition of scientific instruments and books.

The official language of the conference is English. There will be no provision for simultaneous translation. It is anticipated that the registration fee for the symposium will be GBP 100 (GBP 50 for students and GBP 25 for accompanying persons). Participation by students is encouraged.

Social activities will include an opening reception on Sunday evening, a selection of excursions on Wednesday afternoon and evening, and the symposium banquet on Friday evening. There will be a full programme of daytime excursions for accompanying persons.

Polymer analysis and characterization

Brno, Czechoslovakia
23–25 July 1990

IUPAC SPONSORED

The 3rd International Symposium on Polymer Analysis and Characterization, organized in conjunction with the Czechoslovak Academy of Sciences, will be held in Brno, Czechoslovakia, 23–25 July 1990.

This 3-day symposium will consist of poster sessions, invited lectures, and round-table discussions on recent advances in polymer characterization techniques and selected applications. Topics will include chromatography, spectroscopy, light scattering, rheology, thermal analysis, and solution properties of polymers. A short course on gel permeation chromatography will precede the symposium.

For further information please contact Dr Howarth Barth (for address see Conference Calendar) or Dr Josef Janca, Institute of Analytical Chemistry, Czechoslovak Academy of Sciences, Leninova 82, 611 42 Brno, Czechoslovakia. Tel: +42 (5) 744574.

Torum, Poland: venue of IMEBORON VII. ***(Photo courtesy J. Gardzielewska, Torun.)***

Boron chemistry

Torun, Poland
30 July-5 August 1990

IUPAC SPONSORED

The 7th International Meeting on Boron Chemistry (IMEBORON VII) will be held at the Institute of Chemistry, Nicolaus Copernicus University in Torun, Poland.

The purposes of this triennial meeting is to review international progress in all areas of pure and applied boron chemistry. The meeting will consist of two parallel sessions — organic and inorganic. The scientific programme will include eight plenary lectures, approximately 20 session lectures and papers contributed for shorter presentations or for the poster session.

The plenary lectures are:

- Remarkable advances in the boron approach to asymmetric synthesis (H. C. Brown, USA).
- Some thought-provoking polyhedral borane chemistry (N. N. Greenwood and J. D. Kennedy, UK).
- Title to be announced (M. F. Hawthorne, USA).
- The role of theory in structural of boranes (W. N. Lispcomb, USA).
- Boronic esters in asymmetric synthesis (D. S. Matteson, USA).
- Combined application of X-ray and quantum chemical methods to the study of electronic structures of borane derivatives (L. N. Masalov, USSR).
- New perspectives in boron nitrogen chemistry, Part 1 (P. Paetzold, FRG).
- New perspective in boron nitrogen chemistry, Part II (H. Nöth, FRG).

The official language of the meeting is English. There will be no provision for simultaneous translation.

Accommodation will be in hotels and a student dormitory. The cost of accommodation in the

student dormitory and all meals for the meeting period will be approximately USD 200. Full information and reservation forms will be provided with the second circular scheduled for January, 1990.

The registration fees are (before/after 31 March, 1990): for active particpants USD 180/USD 200; accompanying persons USD 75/USD 75; students USD 95/USD 110. IUPAC affiliates are entitled to a 10% reduction in the registration fee. The meeting will include an opening reception, conference dinner and sightseeing.

Torun is located 200 km north-west of the state capital Warsaw. Access for international air travellers is available through Warsaw. Coach transportation from Warsaw airport to Torun will be provided by the organizers on 29 July, 1990. Torun is accessible from European countries by car or train.

The average temperatures in July and August in Torun are about 20°C. The weather is usually sunny although occasional rain may be expected.

All correspondence and requests for the first circular and preliminary registration form should be addressed to the chairman of the organizing committee: Marek Zaidlewicz, Institute of Chemistry, Nicolaus Copernicus University, 7 Gagarin Street, 87-100 Torun, Poland.

Crystal growth and crystallographic assessment of industrial materials

An International School on Crystal Growth and Crystallographic Assessment of Industrial Materials, organized on behalf of the Commission on Crystal Growth and Characterization of the International Union of Crystallography, will be held in Barcelona, Spain, 13–25 May 1990.

Further information from: Dr R. Rodriguez-Clemente, Institute of Materials Science, C.S.I.C. — c/Marti i Franqués, s/n. 08028 Barcelona, Spain. Tel: +34 (3) 3302716. Fax: +34 (3) 4110012.

Environment

The 4th Symposium on Our Environment will take in Singapore in from 21–23 May 1990.

The scientific programme consists of plenary lectures, invited lectures, contributed papers and poster sessions in the following areas: (1) atmospheric environment; (2) marine environment; (3) urban environment (4) public health and industrial hygiene; (5) toxic wastes; (6) pollution monitoring and control.

For further information contact: The Secretariat, Fourth Symposium on Our Environment, c/o Department of Chemistry, National University of Singapore, 10 Kent Ridge Crescent, Singapore 0511.

Materials and processes

The First European East-West Conference on Materials and Processes will be held in Helsinki, Finland, from 10 to 18 June, 1990. The official languages of the symposium will be English and Russian (with simultaneous interpretation).

The scientific programme will cover the following topics: recent achievements in R&D of high-temperature processes; surface engineering; powder metallurgy and ceramics; magnetic, electronic and optical materials; mathematical modelling of materials and processes; polymeric materials; application of materials technology in extreme conditions; and recent developments in analysis techniques.

Further information from: Project Manager Pentti Attila, Teknolink Oy, Hietalahdenkatu 2 B, SF-00180, Finland, Tel: +358 0 6801505, Telex: 123456 intag sf; Fax: +358 0 6801599.

Calorimetry

The 45th Calorimetry Conference will be held from 22 to 27 July, 1990 at the University of Michigan, Ann Arbor, Michigan, USA.

Further information from: Prof. Ron D. Weir, Dept of Chemistry & Chemical Engineering, Royal Military College of Canada, Kingston, Ontario K7K 5LO, Canada. Tel: +1 (613) 541 6612. Fax: +1 (613) 547 3053.

Conferences in Cuba

These scientific events relating to chemistry will be held at the National Scientific Research Center (CENIC), Havana City, from 31st October to 3rd November 1990.

1. 11th Scientific Seminar *(Details from: Dr Silvio Montalvo Martínez, XI Seminario Científico).*
2. 1st Iberolatinoamerican Congress on Ozone Applications *(Details from: Dr Manuel Gomez Moraleda, I Congreso Iberolatinoamericano de Aplicaciones del Ozono).*
3. 2nd Latin American Conference on the Applications of the Mossbauer Effect — LACAME '90 *(Details from: Dr Edilso Reguera-Ruíz, LACAME '90).*

The address of (1) Dr Martinez (2) Dr Moraleda and (3) Dr Reguera-Ruíz is: Centro Nacional de Investigaciones Cientificas, Avenida 25 y calle 158, Cubanacán, Playa, Apartado Postal 6990, Ciudad de La Habana, Cuba. Telex: 511582 CNIC CU.

Conference Calendar

Conference circulars and registration forms for the IUPAC-sponsored conferences listed below may be obtained, upon request, from the names and addresses shown in brackets.

1990

Porous solids

6–9 May. 2nd International Symposium on Characterization of Porous Solids (COPS-2). Alicante, Spain.
(Prof. F. Rodríquez-Reinoso, Departamento de Química Inorganica e Ingeniería Química, Facultad de Ciencias, Universidad de Alicante, Apartado 99, Alicante, Spain.)

Carotenoids

20–25 May. 9th International Symposium on Carotenoids. Kyoto, Japan.
(Dr M. Ito, Kobe Women's College of Pharmacy, Motoyamakita-machi, Kobe 658, Japan.)

Polymer networks

20–25 May. 10th International Symposium on Polymer Networks. Jerusalem, Israel.
(Networks 90, Melia-Te'um, POB 8388, Jerusalem 91082, Israel.)

Catalysis

5–8 June. International Symposium on Unsteady State Processes in Catalysis (USPC). Novosibirsk, USSR.
(Dr S. M. Bogdashev, Institute of Catalysis, Pros. Akad. Lavrentieva 5, Novosibirsk 630090, USSR.)

Trace elements in health and disease

5–8 June. International Symposium on Trace Elements in Health and Disease. Helsinki, Finland.
(Trace Elements/NTES-COMTOX Meeting, Institute of Occupational Health, Office of Information and International Affairs, Ms Virpi Castren, Topeliuksenkatu 41 a A, 00250 Helsinki, Finland. Tel. +358 0 4747 345. Fax. +358 0 4747 548. Telex 121394 tltx sf occuphealth.)

The 2nd International Symposium on Characterization of Porous Solids (COPS-2) will be held in Alicante, Spain, 6–9 May.

Ceramics

24–30 June. 7th World Ceramic Congress. Rimini, Italy.
(7th CIMTEC, Satellite Symposium 1, PO Box 174, 48018 Faenza, Italy. Tel. +39 546 664143. Fax. +39 546 664138.)

Macromolecules

8–13 July. 33rd International Symposium on Macromolecules. Montreal, Canada.
(IUPAC MACRO 90 Secretariat, Dept. of Chem. Engineering, McGill University, 3480 University Street, Montrèal, Quèbec, Canada H3A 2A7. Tel. +1 (514) 398 7487. Fax. +1 (514) 398 6678.)

Mechanisms of polymer strength and toughness

16–19 July. 13th Discussion Conference on Macromolecules Mechanisms of Polymer Strength and Toughness. Prague, Czechoslovakia.
(13th Discussion Conference, P.M.M. Secretariat, c/o Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 16206 Prague, Czechoslovakia. Tel. +42 (2) 360 341. Cable MACRO PRAGUE. Telex 122019 IMCP C.)

Photochemistry

22–28 July. 13th IUPAC International Symposium on Photochemistry. Warwick, UK.
(Dr J. F. Gibson, 13th IUPAC Symposium on Photochemistry, Royal Society of Chemistry, Burlington House, London W1V

0BN. Tel. +44 (1) 734 9864. Fax. +44 (1) 437 8883.)

Polymer analysis and characterization

23–25 July. 3rd International Symposium on Polymer Analysis and Characterization. Brno, Czechoslovakia.
(Dr Howard G. Barth, Du Pont Company, Experimental Station, Wilmington, Delaware 19898, USA. Tel. +1 (302) 695 4354.)

Organic synthesis

23–27 July. 8th International Conference on Organic Synthesis. Helsinki, Finland.
(Prof. T. A. Hase, c/o Travel Experts Limited, P.O. Box 22, SF-00101 Helsinki, Finland. Tel. + 358 (0) 177 331. Telex 122529 trex sf.)

Boron chemistry

30 July–3 August. 7th International Meeting on Boron Chemistry — IMEBORON VII. Torun, Poland.
(Dr J. K. Ruminski, IMEBORON VII Secretary, Institute of Chemistry, Nicolaus Copernicus University, 7 Gagarin Street, 87-100 Torun, Poland.)

Solubility phenomena

1–3 August. 4th International Symposium on Solubility Phenomena. Troy, New York, USA.
(Dr Mark Salomon, Co-Chairman, 4th International Symposium on Solubility Phenomena, PO Box 254, Fair Haven, N.J. 07704, USA.)

Pesticide chemistry

5–11 August. 7th International Congress of Pesticide Chemistry. Hamburg, Federal Republic of Germany.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany. Tel. +49 (69) 7917 360 or +49 (69) 7917 365. Fax. +49 (69) 7917322 and 7917475.)

Solution chemistry

6–10 August. 11th International Conference on Solution Chemistry. Ottawa, Canada.
(Prof. C. Detellier, Department of Chemistry, University of Ottawa, Ottawa, Ontario K1N 9B4, Canada.)

Physical organic chemistry

6–10 August. 10th International Conference on Physical Organic Chemistry. Haifa, Israel.
(Prof. Yitzhak Apeloig, Department of Chemistry, Technion-Israel Institute of Technology, Haifa, 32000, Israel. Tel. +972 (4) 293111. Telex 46406.)

Carbohydrates

12–17 August. 15th International Carbohydrates Symposium. Yokohama, Japan.
(Prof. Yoshiharu Ishido, General Secretary, 15th International Carbohydrate Symposium, c/o Department of Chemistry, Faculty of Science, Tokyo Institute of Technology, O-okayama, Meguro-ku, Tokyo 152, Japan.)

Raman spectroscopy

13–17 August. 12th International Conference on Raman Spectroscopy. Columbia, South Carolina, USA.
(Prof. J. R. Durig, College of Science and Mathematics, University of South Carolina, Columbia, South Carolina 29208-0001, USA. Tel. +1 (803) 777 2505. Fax. +1 (803) 777 3065. Telex 573414 UNIVSCAROL.)

Co-ordination chemistry

13–18 August. 28th International Conference on Co-ordination Chemistry. Gera, GDR.
(Dr D. Walther, Sektion Chemie der Friedrich-Schiller-Universität. Steiger 3, Haus 111, Jena 6900, German Democratic Republic.)

Organometallic chemistry

19–24 August. 14th International Conference on Organometallic Chemistry. Detroit, Michigan, USA.
(Prof. John P. Oliver, The Secretariat, 14th International Conference on Organometallic Chemistry, 135 Chemistry Building, Wayne State University, Detroit, MI 48202, USA.)

Chemical thermodynamics

27–31 August. 11th IUPAC Conference on Chemical Thermodynamics. Como, Italy.
(11th IUPAC Conference on Chemical Thermodynamics, c/o Dip. to Chimica Fisica Applicata, Politecnico di Milano, Via Golgi, 39, 20133 Milano MI, Italy. Tel. +39 (2) 2363770/ 2664317/2364522. Fax. +39 (2) 2664950.)

Medicinal chemistry

2–7 September. 11th International Conference on Medicinal Chemistry. Jerusalem, Israel.
(Prof. Raphael Mechoulam, Department of Natural Products, School of Pharmacy, Hebrew University, Jerusalem, 91904, Israel.)

Organic chemistry of sulfur

2–7 September. 14th International Symposium on the Organic Chemistry of Sulfur. Lodz, Poland.
(Prof. M. Mikolajczyk, Centre of Molecular and Macromolecular Studies, Polish Academy of Sciences, Sienkiewicza 112, 90-363 Lodz, Poland.)

Polymerization reactions

9–13 September. International Symposium on Mechanisms and Kinetics of Polymerization

Reactions: Their Use in Polymer Synthesis. Paris, France.
(SYMPOL 90 — Secrétariat, Laboratoire de Chimie Macromoléculaire, Université Pierre et Marie Curie — UA 24, Tour 44 — 1er étage, 4 Place Jussieu, 75252 Paris Cedex 05, France. Tel. +33 (1) 43 36 25 25 ext. 5541. Fax. +33 (1) 43 54 40 97. Telex UPMC SIX 200 145 F.)

Safety in chemical production

10–13 September. 1st IUPAC Workshop on Safety in Chemical Production. Basel, Switzerland.
(This workshop is not open for general participation but restricted to a limited number of invited participants.)

Solid sampling with optical atomic spectroscopy

8–10 October. 4th International Colloquium on Solid Sampling with Optical Atomic Spectroscopy, Jülich, Federal Republic of Germany.
(Dr R. F. M. Herber, Coronel Laboratorium, Academisch Medisch Centrum, Gebouw K, Meibergdreef 15, 115 AZ Amsterdam, The Netherlands.)

Automation and new technology in the clinical laboratory

9–12 October. 4th International Congress on Automation and New Technology in the Clinical Laboratory. Barcelona, Spain.
(Dr Roman Galimany, Secciódе Automatizaci ón. Servicio de Bioquimica, Residencia Sanitaria Germans Trias i Pujol, Carretera Canyet s/n. 08916 Barcelona, Spain.)

Mycotoxins and phycotoxins

4–15 November. International Symposium and Workshop on Mycotoxins and Phycotoxins. Cairo, Egypt.
(Dr R. Battaglia, Federation of Migros Cooperative, Central Laboratory, PO Box 266, CH-8031 Zürich, Switzerland.)

19th Latin American chemistry congress

5–9 November. 19th Latin American Chemistry Congress. Buenos Aires, Argentina.
(Prof. Eduardo G. Gros, Departamento de Química Orgánica, Faculted de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Pab. 2, Ciudad Universitaria, 1428 Buenos Aires, Argentina.)

Speciality polymers

7–9 November. International Symposium on Speciality Polymers. Singapore.
(International Symposium on Speciality Polymers, c/o Department of Chemistry, National University of Singapore, 10 Kent Ridge Crescent, Singapore 0511.)

1991

Polymer materials

10–15 February. Polymer 91: International Symposium on Polymer Materials: Preparation, Characterization and Properties. Melbourne, Australia.
(Polymer 91 Secretary, PO Box 224, Belmont, Victoria 3216, Australia. Fax. +61 (52) 47 26 57.)

Organic chemistry: technological perspective

15–19 April. 2nd International Symposium Organic Chemistry: Technological Perspectives. Baden-Baden, Federal Republic of Germany.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany.)

Spectroscopy

9–14 June. 17th Colloquium Spectroscopicum Internationale. Bergen, Norway.
(17th Colloquium Spectroscopicum Internationale, HSD Congress — Conference, PO Box 1721 Nordnes, N. 5024 Bergen, Norway.)

Surface and colloid science

7–12 July. 7th International Conference on Surface and Colloid Science. Compiègne, France.
(Prof. M. Clausse, Université de Technologie de Compiègne Cedex, France.)

IUPAC Congress

17–22 August. 33rd IUPAC Congress. Budapest, Hungary.
(33rd IUPAC Congress, Prof. E. Pungor, c/o Hungarian Academy of Sciences, H-1111 Budapest, Gellért tér 4, Hungary.)

Organometallic chemistry

25–29 August. 6th International Symposium on Organometallic Chemistry Directed Toward Organic Synthesis (OMCOS). Utrecht, Netherlands.
(Prof. G. van Koten, Laboratory of Organic Chemistry, Department of Metal Mediated Synthesis, University of Utrecht, Padualaan 8, 3584 CH Utrecht, The Netherlands.)

Analytical sciences

25–31 August. International Congress on Analytical Sciences. Chiba, Japan.
(ICAS 91 Secretariat, The Japan Society for Analytical Chemistry, 1-26-2, Nishigotanda, Shinagawa, Tokyo 141, Japan.)

PURE AND APPLIED CHEMISTRY

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Executive Editor

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NEW TITLES IN THE SOLUBILITY DATA SERIES

Carbon Monoxide

Edited by **R W Cargill**, *Dundee Institute of Technology, Dundee, Scotland, UK*

This volume in the *Solubility Data Series* contains tabulated collections and critical evaluations of original data for the solubility of carbon monoxide in a variety of liquid solvents. The solvents include water, aqueous and non-aqueous salt solutions, a variety of hydrocarbons, a variety of oxygen-containing, halogen-containing, sulfur-containing, and nitrogen-containing organic compounds, and also some biological fluids with which carbon monoxide has an important interaction. The data were gathered from a search of the world's chemical literature through to the end of 1988, and make up a unique and valuable historical survey of the solubility of carbon monoxide. Their publication is timely in view of current concern about carbon monoxide as an atmospheric pollutant, and in view of the role which carbon monoxide is likely to play in the future, as chemical feedstocks may have to change in response to supply and demand patterns, and as alternative energy sources are developed, especially coal gasification technology. For all of these applications, and for numerous others, this volume of well documented and critically evaluated gas solubility data will be of tremendous benefit.

Contents: Foreword. Preface. The Solubility of Gases in Liquids. Carbon Monoxide Solubilities. Water. Sea-water. Salt solutions (aqueous). Salt solutions (non-aqueous). Organic solvents and water. Saturated and unsaturated hydrocarbons. Cyclic hydrocarbons. Aromatic hydrocarbons. Alcohols. Ketones, acids, esters, ethers. Organic compounds containing halogen. Organic compounds containing sulphur. Organic compounds containing nitrogen. Biological fluids. Miscellaneous fluids. **System Index. Registry Number Index. Author Index. *Solubility Data Series*: Published and Forthcoming Volumes.**

X= Solubility Data Series, Volume 43
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Alkaline Earth Metal Perchlorates

Edited by **Chee-Yan Chan**, *University of Malaya, Kuala Lumpur, Malaysia*; **Ivan N Lepeshkov**, *Kurnakov Institute of General and Inorganic Chemistry, Moscow, USSR*; **Kean H Khoo**, *University of Malaya, Kuala Lumpur, Malaysia*

Alkaline Earth Metal Perchlorates is Volume 41 of the *Solubility Data Series*. A substantial amount of solubility data for the alkaline earth metal perchlorates (beryllium, magnesium, strontium and barium), in water, non-aqueous solvents and multicomponent systems, has not been made readily available to scientists outside the USSR in the past because the data were published in journals that are not easily accessible. This volume addresses this problem through critical evaluations of relevant solubility data compiled from all recognized publications, many of which are of Soviet origin. Literature coverage comprises about 140 references, and is complete up to the end of 1987. The original data, especially those from Soviet sources, have been recalculated to conform to SI units. Numerous phase diagrams have also been included to assist the reader in identifying various equilibria. As in all volumes of the Series, system, formula, CAS Registry Number and author indices are included. The title compounds have wide application, ranging from simple uses as drying agents and gas absorbents to more complex uses as catalytic curing agents in the textile industry.

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Cumulative Index Volumes 20-38

Edited by **C L Young**, *Department of Chemistry, University of Melbourne, Parkville, Victoria, Australia*

This *Cumulative Index* covers Volumes 20 to 38 of the *Solubility Data Series*. The first cumulative index, Volume 19, published in 1985, covered the first eighteen volumes of the series. Both indexes have been produced to enable workers to locate data both for the system of interest and closely related systems without the necessity of consulting the indexes of individual volumes. The index consists of three sections: a System Index, an Author Index and a Chemical Contracts Registry Number Index.

Contents: Section headings: System Index. Registry Number Index. Author Index.

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries;
- to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;
- to co-operate with other international organizations which deal with topics of a chemical nature;
- to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 46 countries, each represented by a national organization, such as an academy of science or research council.

National Adhering Organizations

Academy of Scientific Research and Technology **(Arab Republic of Egypt)**
Asociación Quimica Argentina **(Argentina)**
Australian Academy of Science **(Australia)**
Österricheische Akademie der Wissenschaften **(Austria)**
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Chemistry International

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The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

1990, Vol. 12. No. 3 (May)

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Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

EDITOR: Michael Freemantle

SECRETARIAL ASSISTANT: Mary Patterson

PRODUCTION EDITOR: Jonathan Ray

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Front cover: Stockholm, venue of the 32nd IUPAC Congress (see pages 106–116).

1990 International Union of Pure and Applied Chemistry

Chemistry International

The *Chemistry International* Editorial Advisory Board met in Lund last year during the 35th IUPAC General Assembly. The following report is based on the minutes of the meeting.

The meeting of the *Chemistry International* Editorial Advisory Board at the Lund General Assembly was opened by the chairman, Prof. Tom West, who welcomed members of the board. He pointed out that IUPAC operated *Chemistry International (CI)* using part-time staff at the Secretariat in Oxford. Approximately 50% of Dr Michael Freemantle's time and 30% of his assistant Mrs Mary Patterson's time are devoted to the magazine. The other 50% of Freemantle's time is taken up with his other duties as Affiliate Affairs Secretary and Information Officer.

Production, schedules and distribution

Freemantle drew attention to his editors report for 1989, in which he pointed out that there have been some problems with Blackwell Scientific Publications (BSP) since the last board meeting. The first problem concerned distribution when BSP switched to a new computerized system. The Secretariat received many complaints from affiliates around the world that they were not receiving *CI*. These problems have now largely been resolved.

Further problems occurred when BSP decided to switch to new printers at the beginning of 1989. Galleys and proofs, particularly for the first issue of 1989, were poor quality and caused major problems for both BSP and the editor. The quality has since improved. Dr Allen Stevens (BSP) pointed out that the situation is being kept under review.

The *Chemistry International* Editorial Advisory Board at Lund.

Print run and circulation

Freemantle informed the board of the circulation figures for *CI*. At present the print run for the magazine is 10 500, of which nearly 7900 are distributed to affiliates, and 1600 'free' copies to members of standing and division committees, commissions, national adhering organizations, associated organizations, observer countries, and company associates. There are also 400 miscellaneous (e.g. library) paid subscriptions, bringing the total circulation at present to some 10 000. West pointed out that the aim is to increase the number of affiliates to 10 000.

Stevens pointed out to the board that back copies of each issue are stocked at the BSP warehouse in Oxford for about 3 years. West and Prof. Ekkehard Fluck (Inorganic Chemistry Division) reported that at the Division Presidents' meeting in Lund there was a suggestion that 50-100 copies of the magazine should be sent to each IUPAC-sponsored conference together with information about the affiliate membership programme. The board welcomed this proposal.

Dr Stephen Heller (Committee on Chemical Databases) thought that the size and frequency of the magazine might be increased. West commented that the magazine has probably already reached its limit (40 pages per issue, six times a year) because of cost constraints — particularly in connection with the IUPAC affiliate subscription.

Contents

Freemantle outlined the aims of *CI*. These are to provide information about IUPAC, its activities, conferences, publications and members (including affiliates) and to provide publicity for IUPAC wherever possible. In addition, the magazine aims to provide a forum for discussion of IUPAC issues.

West pointed out that a recent innovation had been the introduction of an 'Affiliate Affairs' column in order to cater for the large proportion of affiliate readers.

In general, the board approved the direction in which the magazine was moving. Prof. Kozo Kuchitsu (Committee on Teaching of Chemistry) and Prof. Guennadi Zaikov (Physical Chemistry Division) both spoke in support of the magazine and considered that, in their opinion, its quality had improved over recent years. Prof. Bob Marchessault (CHEMRAWN Committee) said that the magazine had style, but there was still another step to go.

Prof. Nelson Leonard (Organic Chemistry Division) commented that some photographs were duplicated in the same issue of the magazine, and suggested that pictures of prominent IUPAC persons 'clinking glasses' should be avoided. Freemantle agreed.

Leonard also suggested that there should be wider coverage of IUPAC-sponsored conferences, based on the reports of IUPAC's official representatives. Freemantle drew attention to several reports he had received recently, and the board agreed that these were not always suitable for publication in the magazine.

Leonard proposed that more articles of general interest on new and emerging chemical topics might be included in order to cater for the world scientific community.

Chemistry International **editor Michael Freemantle at the Secretariat in Oxford.**

Freemantle replied that all feature articles included in the magazine should preferably be linked to IUPAC activities. He added that, although general interest articles on new topics linked to the work of IUPAC are desirable, he had to rely on members of IUPAC committees and commissions (including the *CI* Editorial Advisory Board) to prepare such articles.

Dr Dermot O'Sullivan (Committee on Publications) pointed to some instances of poor page layout. Freemantle agreed that these were unsatisfactory and that efforts would be made to improve this aspect of the magazine.

West informed the board that the author of a recent article in the magazine had been unhappy with the editing. Freemantle explained that the tight production schedule did not always allow authors to see proofs, either at the galley stage or the page proof stage. The schedule only allowed one week for each stage. However, several members stressed that it was desirable for authors to read the proofs and that, with the increasing availablity of fax, this should be possible in many cases.

Advertising

Freemantle reminded the board that the present contract with BSP divides advertising revenue 80:20 between BSP and IUPAC. Stevens said that the present contract is under review with the IUPAC Publications Committee, and that BSP would be sympathetic to a more favourable share for IUPAC.

The question then arose of how to attract more advertising to the magazine now that its circulation is in the region of 10 000. The problem was that the *CI* readership market for specific products is not well focused and thus does not encourage companies to advertise in the magazine. Dr Danny Fagandini (Committee on Chemistry and Industry) thought it might be worthwhile to approach IUPAC company associates. West pointed out that this had been attempted in the past but with little success.

O'Sullivan and Prof. Norbetto Montalbetti (Clinical Chemistry Division) pursued the question of advertising and suggested that the magazine might appeal more to the image or public relations type of advertising. Freemantle agreed to meet with Fagandini to discuss this matter further. West also agreed to call a meeting at Lund of representatives from some national adhering organizations to see if they might be able to help

Role of Editorial Advisory Board

West reminded members of the terms of reference of the *CI* Editorial Advisory Board. Freemantle expressed his appreciation of the contributions and advice he had received over the past 2 years and hoped that the Board would continue actively to support the magazine.

Hamburg is venue of next general assembly

The 36th IUPAC General Assembly will be held in Hamburg, Federal Republic of Germany from Wednesday 7th August to Thursday 15th August 1991. Further details will be published in forthcoming issues of *CI*.

Iraqi Chemists Union

The Iraqi Chemists Union — the IUPAC National Adhering Organization in Iraq — has its headquarters in Baghdad. Its president is Dr Zuhair Sharif Salih and its vice-president Dr Saad Ismail. Both represented Iraq at the IUPAC General Assembly in Lund last year. Dr Salih was leader of the Iraqi delegation. He is also General Secretary of the Union of Arab Chemists — an Associated Organization of IUPAC.

Dr Salih reports that over the last 4 years the Union has organized four national conferences. These have included papers of a pure and applied nature and also short symposia on continuous study, chemical and industrial pollution, teaching of chemistry for secondary schools, university–industry interactions in chemistry and the treatment of chemical wastes.

Amongst the publications of the Union is the scientific journal *Iraqi Journal of Chemistry*. Four volumes, each consisting of two issues, have been published over the past 4 years. Journal abstracts appear in *Chemical Abstracts* and other international abstracts.

Dr Saad Ismail and Dr Zuhair Salih (right) at the Lund General Assembly.

In the field of education, the Union has arranged courses in continuous studies in various branches of pure and applied chemistry. The Union has also invited more than 20 visiting lecturers to the country to present lectures on a variety of subjects.

The Iraqi Chemists Union has made positive contributions to all ordinary annual meetings at the general assemblies of the Union of Arab Chemists over the last 4 years. The Union has also participated at the general assemblies of the Federation of Asian Chemical Societies.

In addition, representatives of the Union have been present at the recent IUPAC general assemblies in Lund and Boston and also the congresses in Sofia and Stockholm. For example, at the IUPAC congress in Stockholm, Dr Basil Al-Sader (University of Baghdad) presented a paper 'On the mechanism of the 1.3-dipolar cyclo-addition of phenyl azide to methyl 3-pyrrolidinoacrylate. An isotope effect measurement'.

Dr Basil Al-Sader and Prof. Muthana Shanshal (right) both presented posters at the Stockholm Congress.

At the same congress, Prof. Muthana Shanshal displayed a poster on 'Diffusion of ubiquinones into tenside vesicles'. F. S. Abed was joint author of the poster. Both Shanshal and Abed are at the Saddam University for Engineering and Science in Baghdad.

For further information about activities and publications of the Union please contact: Dr Zuhair Sharif Salih, President, Union of Iraqi Chemists, Damascus Street, PO Box 8011, Salihiya, Baghdad, Republic of Iraq. Tel: +964 (1) 5370313.

Howard Worth will liaise with WHO

Dr Howard G. J. Worth (UK), a member of the Clinical Chemistry Division Committee, is IUPAC's newly appointed liaison person to the World Health Organization.

The Union has recently had its status of a non-governmental organization in official relationship with this UN agency renewed for the next triennium. Worth will seek to strengthen existing collaboration between the two organizations, particularly taking into account IUPAC's new major mission-oriented programme on 'Chemistry and the Environment'

Dr Howard Worth (right) meets Applied Chemistry Division President Dr Lewis Coles at the IUPAC Secretariat in Oxford.

and its 1st Workshop on Safety in Chemical Production (to be held in Basel, Switzerland, 10–13 September 1990).

When Worth visited the IUPAC Secretariat in November last year, he met with Dr Lewis Coles, President of the Applied Chemistry Division, to consider which of the current work of this Division is of special interest to WHO.

Unusual nine-membered ring formation

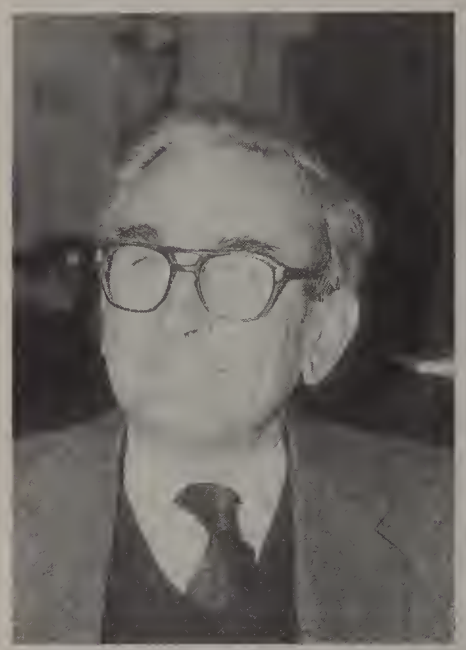
The spontaneous formation of a nine-membered heteronational ring of macromolecular scientists was observed during the Lund General Assembly and captured in the above photograph.

The nature of bonding between members of such rings is thought to be of the 'divisional' type and the rate of ring formation is almost certainly catalysed by coffee. Spontaneous ring closure followed by rupture of the ring and dispersal of one-, two- or three-membered fragments occurred over a period of about 15–20 minutes with a frequency of at least twice a day.

Hugh Rowlinson visits IUPAC Secretariat

Dr Hugh C. Rowlinson was one of several visitors to the IUPAC Secretariat in Oxford over recent months. Rowlinson is Chairman of the Canadian National Committee for IUPAC. He led the Canadian delegation to Council at the Lund General Assembly. He was formerly Vice-President/ Research and Technology, Canadian Industries Ltd.

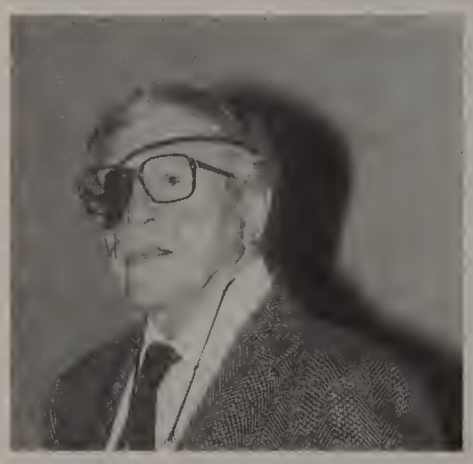
During his visit to the Secretariat, he discussed various IUPAC matters such as national subscriptions, company associates, the affiliate membership programme and the election at Lund of new members of IUPAC bodies.



Hugh Rowlinson.

Errata

The balance sheet (as at 31st December 1988) published in *CI,* Vol. 11, No. 6, p. 246, 1989, contained an error. The amount shown against '**Liabilities** *Provisions* CHEMRAWN Rolling Fund' should have been USD 20 321.26 and NOT USD 20 231.26. Apologies to all concerned for this transposition.



Leo Brewer at the 6th International Conference on High Temperatures, Gaithersburg, April 1989.

Apologies also to Leo Brewer, the father of high temperature chemistry, for referring to him as Lev Brewer in the January issue (*CI,* Vol. 12, No. 1, p. 31, 1990).

Names and Addresses

Full details (names, addresses, telephone /telex/fax numbers) of all commission and committee chairpersons and secretaries and IUPAC officers were published in the November 1989 issue of *CI* (Vol. 11, No. 6, pp. 225–235). The IUPAC Secretariat has been notified of the following additions and changes:

Prof. A. Björkman (Treasurer). Tel: +45 42 88 32 88.

Prof. G. den Böef (President, Analytical Chemistry Division). Fax: +31 (20) 5255698.

Dr Rita Cornelis (Secretary, Commission on Toxicology). Fax: +32 (91) 227512.

Mr E. W. Godly (Secretary, Commission on Nomenclature of Inorganic Chemistry), 10, Lawrence Avenue, New Malden, Surrey KT3 5LY, UK. Tel: +44 (1) 330 5124.

Prof. Darlene C. Hoffman (Chairman, Commission on Radiochemistry and Nuclear Techniques). Fax: +1 (415) 486 4515.

Dr W. J. Koch (Secretary, Organic Chemistry Division Committee). Research and Development, Sandoz Products (Switzerland) Ltd., CH-4002 — Basle, Switzerland. Tel: +41 (61) 324 3119. Telex: 96505041 SDZ CH. Fax: +41 (61) 324 3911.

Dr H. P. Lehmann (Secretary, Clinical Chemistry Division Committee). Fax: +1 (504) 568 6037.

Dr H. Olesen (Chairman, Commission on Quantities and Units). Fax: +45 35 37 66 45.

We regret to record the death of

Prof. M. M. Abdel Kader, Arab Republic of Egypt (24 June 1989) — Commission on Teaching of Clinical Chemistry (1975–1988), Committee on Teaching of Chemistry (1977–79), Commission on Food Chemistry (1980–89).

Prof. I. P. Alimarin, USSR (17 December 1989) — Analytical Chemistry Division Committee (1959–1963, 1967–1971), Commission on Analytical Nomenclature (1959–1973).

Prof. W. J. Bailey, USA (17 December 1989) — Macromolecular Division Committee (1968–1983).

Dr I. L. Barnes, USA (11 January 1990) — Commission on Atomic Weights and Isotopic Abundances (1975–1989).

Prof. P. Pino, Switzerland (9 July 1989) — Macromolecular Division Committee (1983–89).

Affiliate Affairs

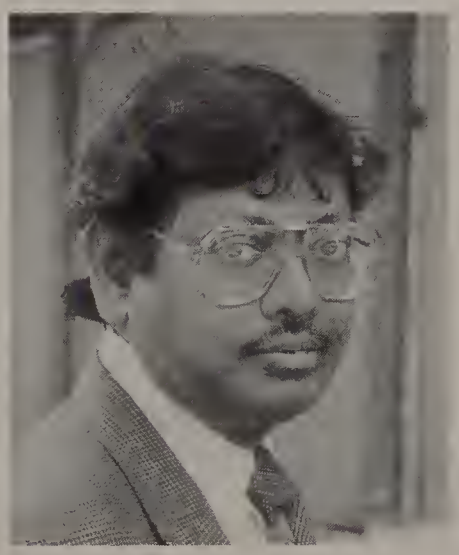
Affiliate registration

Affiliates receiving this issue of *CI* will find a yellow Affiliate Membership Registration Form and letter enclosed with the magazine. These are distributed to all affiliates every 2 years.

All affiliates should complete the yellow form in CAPITAL LETTERS and return it to the Affiliate Affairs Secretary at the IUPAC Secretariat in Oxford **before October 31st, 1990.** The information provided will be entered onto the IUPAC affiliate membership database at the Secretariat. This information will be used exclusively for IUPAC purposes. In particular, at the beginning of next year, the Secretariat will submit a list of affiliates with specific interests to the appropriate commissions. This will help affiliates to become visible as potential recruits for the scientific work of the Union.

Any affiliate registered for 1990 not receiving a yellow Affiliate Membership Registration Form and letter in this copy of the magazine should inform the Affiliate Affairs Secretary in Oxford.

Affiliates in Jamaica



Prof. Tara Dasgupta is responsible for affiliate membership in Jamaica.

In August last year, National Affiliate Membership Secretary for Jamaica, Prof. Tara Dasgupta paid a visit to the IUPAC Secretariat in Oxford. The aim of the visit was to strengthen contacts between Jamaica and IUPAC and to promote affiliate activities in the country. In 1989 there were 18

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IUPAC Secretariat,
Bank Court Chambers,
2–3 Pound Way,
Templars Square,
Cowley,
Oxford OX4 3YF,
UK.

affiliates in Jamaica of whom 10 were sponsored by IUPAC.

Dasgupta has been Professor of Inorganic Chemistry at the University of West Indies, Kingston since 1980. He joined the university as a lecturer in 1974. The university has three campuses: Mona Campus (Jamaica), St Augustine Campus (Trinidad) and Cave Hill (Barbados).

Dasgupta has 12 MPhil and PhD students working on the mechanisms of inorganic reactions, pesticides — especially PCB degradation by catalytic oxidation, pesticides in ground water and other projects. He is also editor of *Jamaican Journal of Science and Technology*.

Jamaica is currently an IUPAC Observer Country. It is represented by the Scientific Research Council, Kingston, Jamaica.

IUPAC ties and scarves

All IUPAC affiliates and members of IUPAC bodies are entitled to wear an official IUPAC tie or scarf. So why not wave the IUPAC flag when you attend a local, national, regional or international meeting on chemisty?

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Chemical substructure search software for personal computers

Stephen R. Heller and Daniel E. Meyer

This is the third in a series of articles aiming to promote a higher awareness of the computer applications in the management, dissemination and uses of chemical data. It describes a number of computer programs which perform chemical substructure searching on personal computers.

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Introduction

Part of the educational activities of the IUPAC Committee on Chemical Databases (CCDB) is to inform IUPAC members of interesting and significant computer activities. This relates to the CCDB term of reference to promote a higher awareness of the computer applications in the management, dissemination and uses of chemical data.

The first article described online computer services[1a]. The second was concerned with the Beilstein and Gmelin databases[1b]. This third article describes a number of computer programs which perform chemical substructure searching on personal computers (PCs).

Chemical substructure searching (SSS) is the ability to search a structure database using any structure fragment. (Using the entire or full structure is usually called an identity search or exact-match search.) The results of a SSS are the chemical structures in the database which contain the query structure fragment. An example of such a search, using HTSS software (see below), is shown in Figs 1–5.

Over the years there have been many ways to represent chemicals, from nomenclature to chemical notations to structure diagrams (which are actually mathematical graphs). There are problems with some forms of representation, such as nomenclature, as noted in the first article[1a]. Linear notations, such as the Wiswesser Line Notation (WLN)[2] as well as other notations such as SMILES[3], all require learning a new 'language'.

With more powerful computers and inexpensive disk space becoming available in the past few years, graphic input, storage, and searching of structures using PCs has become fairly commonplace. The best part of drawing a structure or fragment is that it is the universal chemical language and thus readily understood by all chemists. In this article we discuss PC computer systems for searching which use structure diagrams for input (query) and output (answers).

Today, it is possible to search the Chemical Abstracts structure file of over nine million compounds online using the STN or DARC systems[4] These systems are available via telephone access from anywhere in the world for a cost of about USD

250 per hour.

However, many chemists do not need regular access to such a large database. In most cases a database of the chemicals in one's own laboratory or those under current study, or the chemicals from a commercial catalogue, would satisfy day to day

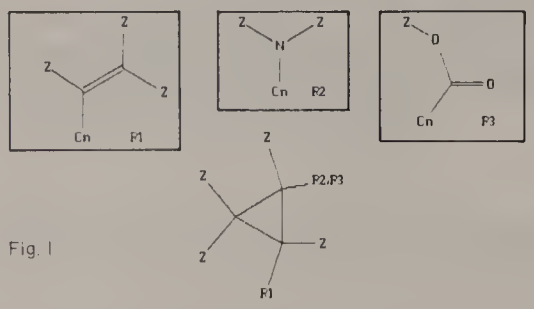


Fig. 1

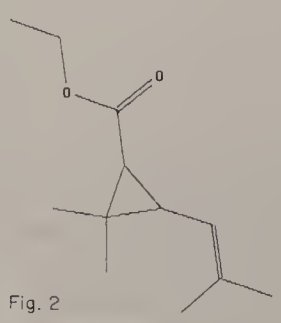


Fig. 2

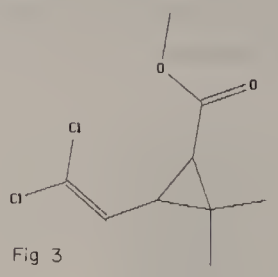


Fig. 3

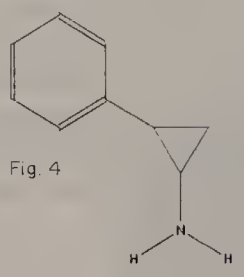


Fig. 4

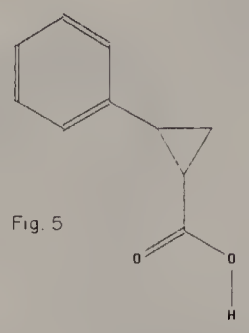


Fig. 5

Fig 1. Search for cyclopropyl derivatives with four Z substituents (Z means every substituent, hydrogen included) and a R1, R2 and R3 substituent, defined in separate windows. The result of this request is shown in Figs 2–5. (see *Janssen Chimica Acta,* Vol. 6, No. 3, p. 20, 1988).

needs. Having one's own computerized file card system of chemicals is a goal which can easily be obtained.

With the advent of the personal computer, a number of companies have developed, and are making available for a nominal cost, software which allows individual researchers to create, maintain, and add to a personal file of chemical structures[5,6]. It is also possible to buy some sample databases and use these in teaching courses in universities and industry.

Hardware capabilities and costs

At present the only SSS software for PCs uses the IBM type MS-DOS-based operating systems. No software for the Apple Macintosh is yet available, although the producers of two such software packages, HTSS and ChemData[7] have indicated that such versions will be available in 1990.

The specific hardware requirements vary from program to program, with some programs having such limited requirements that almost all PCs are able to run them without the need to buy additional equipment. To use some other programs to their full capability, in particular ChemBase, requires computer hardware that can easily cost about USD 6000–7000 as one needs a high resolution colour system with a fully equipped laser printer system. Put another way, 'ChemText's hardware appetite is quite hefty'[8]. However, it should be noted that ChemText can run on hardware costing as little as a total of USD 2000.

With more powerful computers and inexpensive disk space becoming available, graphic input, storage, and searching of structures using PCs has become fairly commonplace.

To run most of the software described in this article the user needs an IBM PC or equipment with 512K of main memory, a graphics capability (usually a Hercules graphics board, a Colour Graphics Adapter (CGA) or Extended Graphics Adapter (EGA) or equivalent), a mouse for structure input, and preferably a hard disk. Such a system should easily be available for about USD 1500 in the USA, and slightly higher in other countries. At this price, it is felt that such equipment is well within the means of individual chemists.

Available PC SSS software package capabilities

This article describes five SSS PC programs. They are, in alphabetical order:

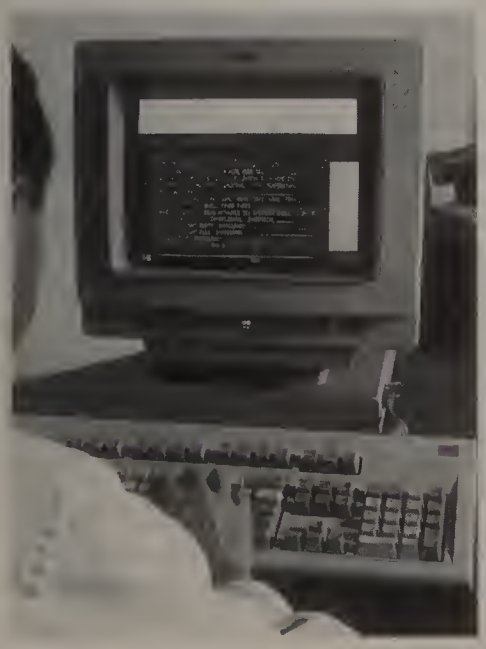
- ChemBase
- ChemFile II
- ChemSmart
- HTSS (TREE)
- PSIDOM

One of these packages (HTSS) also runs on other, larger computers, such as the VAX or IBM mainframe. As these computers are outside the scope of the computer systems available in laboratories or offices, these aspects and features will not be discussed.

Structure search program descriptions

These five packages all allow the chemist for the first time to have this powerful tool available in the laboratory or office. For university chemists, either for their own research activities or for use in teaching in courses, the ChemFile II or ChemSmart programs are useful for learning SSS techniques and methods.

For those with more advanced needs, the HTSS and PSIDOM systems are likely to be the next step up. The best supported, but also the most expensive of the five packages is ChemBase. In any case, what is of most importance is for chemists to begin to make use of this type of computer software, as it is likely to gain acceptance throughout the chemical community.



Chemists can now use the powerful tool of chemical substructure searching (SSS) in their laboratories or offices.

CHEMBASE

ChemBase is the chemical substructure search software from Pergamon-Molecular Design Ltd (MDL)[8–12]. MDL has sold more in-house systems than any other company in the field, and lately has expanded into the PC market.

ChemBase is a well-polished software package, with excellent documentation and a very good user interface. ChemBase handles data and text information as well as structures. ChemBase also interfaces directly to the MDL text processor, ChemText. It requires an IBM PC, with 640K of RAM, a hard disk, a mouse, and preferably an EGA card (although a CGA or Hercules graphics adapter will work), and a colour monitor (although it will run quite adequately on a monochrome monitor).

A fully equipped laser printer brings out all of the superior features of the program, but dot matrix output is acceptable. Its search speed and the size of files it can handle are less than for some of the other programs, such as HTSS and PSIDOM. ChemBase also allows users to design their own output format.

CHEMFILE II

ChemFile II is the chemical substructure search program from COMPress[12,13], written by John Figueras, a retired chemist from Eastman Kodak. ChemFile II is a very affordable floppy disk-based package, designed for very small files and for people on a budget, who have a PC with 256K of memory and 5¼ inch floppy disks.

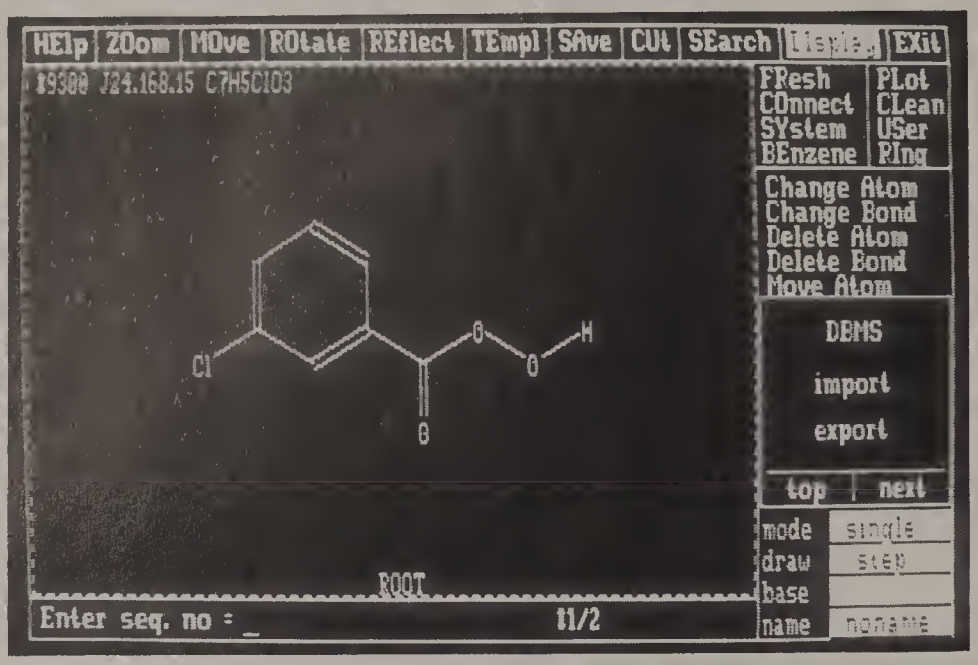
If you have more than one disk of data to search, the program allows you to continue the search or use another disk of data. Each diskette can hold data for about 250 compounds, which makes a complete search of a large database (of several thousand compounds) slow and requires the user to sit at the terminal and change disks until the search is completed.

Text and numerical information as well as structures can be entered. ChemFile II supports up to 20 user-defined data fields, but the size of each field is limited. A good feature of this program is the ability to search for ranges of numerical data, such as boiling point ranges. The documentation and user interface are both good.

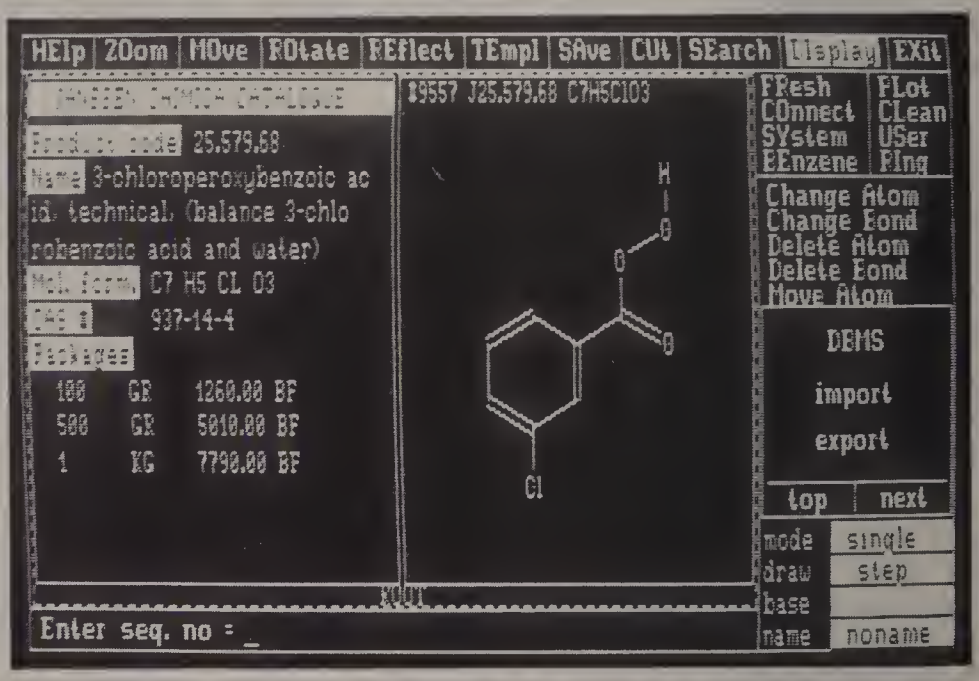
CHEMSMART

ChemSmart is the chemical substructure search program being marketed by ISI[14–16], and written by Scott Gould[11–13]. ChemSmart is another affordable

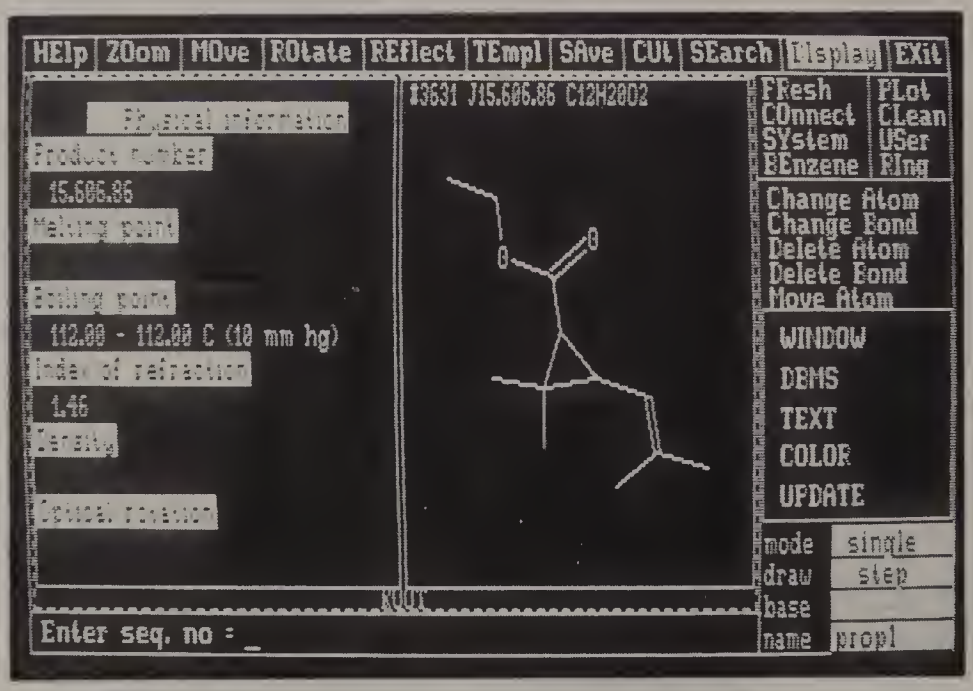
Chemical structures on a PC computer screen



The result of the search for 3-chloroperoxy benzoic acid.



Besides the chemical structure (see photograph above) other information such as molecular formula, CAS-No., packages, and prices can be shown. Further physical and safety data are also available.



This is an example of the result of a search for cyclopropyl derivatives (see also Fig. 2).

These three photographs and Figs 1-5 are examples of the use of Hierarchical Tree-Substructure Software (HTSS). They were kindly provided by Janssen Chimica, Technical Information Services, Turnhoutseweg 30, B-23440 Beerse, Belgium.

package for people on a budget with just a PC and 5¼ inch floppy disks.

The program supports some numerical and text information searching as well as structure searching. However, while a good deal of data can be entered, stored, and displayed, only the molecular formula and the compound names are searchable.

ChemSmart comes with a sample database of 250 compounds, and additional specialized databases from the main ISI Index Chemicus database are available for purchase. These databases all have Index Chemicus numbers, but no CAS Registry number. For teaching purposes, it would seem this product is very useful. The documentation and user interface are quite good, but structure entry is slow.

HTSS

HTSS is the chemical substructure search program from Hierarchic Tree Substructure Search Systems[17,18] and was developed in Hungary by Peter Bruck and colleagues. It is to be used by CCDB for IUPAC computerized structure search products (see Box).

The official release of the PC version took place early in 1988, so it is too soon to comment on updates and improvements. Versions of the HTSS software are also available which run on the VAX family of computers and IBM mainframe computers.

HTSS is marketed in the USA under the names HTSS and TREE. It does not support data and text, but rather interfaces with PC database management programs, such as dBASE III Plus. The program allows for Markush structure searching, so long as you have such a database of Markush structures[19]. It also interfaces with virtually all word processors by allowing the user to add a structure at any place within a word-processing program, such as WordStar or WordPerfect.

HTSS is by far the fastest of all the chemical structure software packages available, and can easily handle large files of 25 000 structures or more. The documentation is its weakest point, but is improving. The tutorial demonstration disk which comes with the system and the user interface are excellent.

PSIDOM

PSIDOM (Professional Structure Image Database On Microcomputer) is part of a family of PC software for chemists from Hampden Data Services[20]. PSIGEN is the basic software which allows an IBM PC computer to create connection tables for chemical representation and then display these chemicals as structures on the screen.

PsiBase (which includes the PSIGEN drawing capabilities) is the structure search module which takes the PSIGEN connection tables and actually performs the substructure searching. PsiBase also allows the user to store and search data together with the chemical structures.

At present the entire software system is being bundled together with the Derwent Standard Drug File which contains over 16 000 chemical structures. The system has mouse-based structure input as well as keyboard input. The documentation is good and the program is easy to learn. The ability to interface with and easily use other modules developed by the company, such as PsiCard, PsiView, PsiPlot, and PsiText, are a positive feature of this system.

The Hampden Data Services software is also the basis of the recently released STN Express software[21,22] which allows offline structure query formulation before going online to search the CAS Online structure database on STN-International. PsiBase and STN Express are totally compatible and queries may be exchanged between the two systems.

Summary

This article has described a number of commercially available computer programs which allow chemists from all IUPAC countries throughout the world to create structure databases and search these structures, by chemical structure fragment, for chemical structures in a PC database.

The ability to perform substructure searching is a valuable new tool for chemists in universities, industry and government. Now that such software has become relatively inexpensive and easy to install and use on personal computers, which chemists already own or have access to, this technique should become more popular throughout the chemical community.

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22. STN Express, STN International, PO Box 02228, Columbus, OH 43202, USA. Tel: +1 (800) 848 6538 or +1 (614) 421 3600, or STN International Postfach 2465, D-7500 Karlsruhe 1, FRG. Tel: +49 (724) 824566 or STN International, JICST, 5-2 Negatacho 2 chrome, Chiyoda-ku, Tokyo 100, Japan. Tel: +81 (258) 46 6507.

Commission & Committee News

Safety in chemical production

When the Committee on Chemistry and Industry (COCI) met in Lund it discussed a number of important topics including the following: 1st IUPAC Workshop on Safety in Chemical Production (10–13 September 1990, Basle, Switzerland); envisaged increase in national members of COCI; involvement with the first IUPAC horizontal programme on 'Chemistry and the environment'; and the regular COCI– CHEMRAWN (CHEMical Research Applied to World Needs Committee) contacts.

The 1st IUPAC Workshop on Safety in Chemical Production aims to provide participants with 'hands-on' experience of critical risk assessment of running production sites. There will also be discussions on safety education at universities and in industry. The participants will mostly be invited Third World scientists from universities, industry and government.

The committee discussed with the IUPAC Executive Committee possible ways of increasing COCI representation from Eastern Europe and the developing world. COCI hopes to obtain a more balanced list of members with representatives from most countries with a chemical industry of an appropriate size.

COCI will elect one of its members to liaise on a permanent basis with the IUPAC horizontal

programme on 'Chemistry and the environment' which is being coordinated by Prof. Valentin Koptyug.

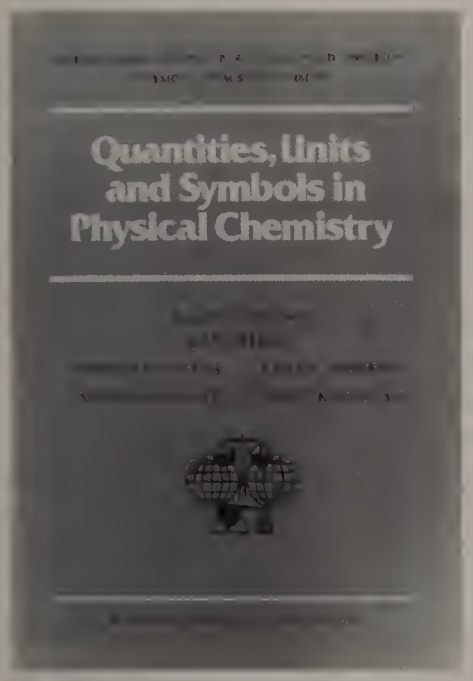
Mutual exchange of information between CHEMRAWN and COCI is now well established. It allows early exchange of information and the streamlining of current and future activities of both committees.

The next COCI meeting will be held in Paris, France, 28–29 September 1990.

Albert Fischli

'Green Book' continues to improve

When the Commission on Physicochemical Symbols, Terminology and Units (I.1) met at the Lund General Assembly, it was their first meeting since the publication in 1988 of the greatly revised manual on *Quantities, units and symbols in physical chemistry* (the 'Green Book' — see *CI*, Vol. 11, No. 1, pp. 1–4, 1989). Commission I.1 therefore devoted considerable time at Lund to discussion of how the book had been received by the chemical community.



The Green Book has found wide acceptance and has been translated into Russian. Other translations are under way.

Comments have been collected and considered carefully so that they can be taken into account in future editions. The tolerant, advisory approach of the Green Book has been favourably accepted by readers and this approach will be maintained in future editions.

The main task of Commission I.1 at present is the preparation of texts to be included in future revisions. Thus, a subject index has been prepared and its latest version is ready for publication. The second draft of the section on units for dimensionless quantities has been carefully analysed and minor revisions have been agreed. This draft will be circulated for review. Texts will be drafted which include quantities used in laser and molecular beam studies and the section on quantum mechanics will be extended to include more quantities and symbols used in quantum chemical calculations.

It seems that the Green Book, quantity calculus and SI units have found wide acceptance in European countries and in Japan and that the main challenge for commission members is to publicize the book and its recommendations among the practicing chemists in the USA. Favourable reviews, articles in the *Journal of Chemical Education* and the many complimentary copies sent to journal editors do help, but the Education Division of the American Chemical Society will be approached directly and the attention of IUPAC's Committee on Teaching of Chemistry will be drawn to this problem.

The Green Book has already been translated into Russian and translations into Japanese, Portuguese and Romanian are under way. The *Abbreviated List* has been translated into Russian and Japanese.

Commission I.1 does not meet regularly, since the members do not go to the same scientific meetings. Most of the work is being done by correspondence and occasional visits of the chairman to some other members.

The next meeting of the whole commission is planned to take place at the 1991 General Assembly in Germany.

Tomislav Cvitaš

LUND

Thermodynamics

The Commission on Thermodynamics (1.2) met in Lund from 10 to 13 August 1989. The status of the work of the commission can be summarized as follows.

Projects approaching completion

The project 'Definitions of activities and related quantities in chemical thermodynamics' (coordinators: M. B. Ewing and G. Olofsson) has resulted in a document with the title 'Standard quantities in chemical thermodynamics: fugacities, activities and equilibrium constants for pure and mixed phases' which is in the process of being reviewed as an IUPAC recommendation. Publication is expected during the latter part of 1990.

Work on Volume 2 of the book *The Measurement of transport properties of fluids — experimental chemical thermodynamics* (coordinator: W. A. Wakeham) is progressing very satisfactorily. The final editing and typesetting is currently being carried out and publication by Blackwell Scientific Publications is expected in 1990.

Projects proposed for initiation

The commission proposes to prepare Volume 3 in the series *Experimental chemical thermodynamics* entitled *Solution calorimetry* (coordinators: P. A. G. O'Hare and K. N. Marsh). The book will deal with experimental techniques in modern solution calorimetry. The tentative date for submission of manuscripts is 1 August 1990 and the complete volume is expected to be ready for submission to the publisher at the end of 1990.

A new project on 'Electrolyte solution data' (coordinator: J. Barthel) is being proposed. The objectives are to formulate recommendations on a unified approach to treatment of data on electrolyte solutions in various solvents and to carry out critical compilations of thermodynamic and transport data on such systems.

Possible future projects

The commission decided to set up a working party, with Prof. G. Della Gatta (Italy) as chairman, to carry out a feasibility study on 'Standards for temperature and enthalpy of fusion for measurements with differential scanning calorimeters at high temperatures'. The project is to be carried out in co-operation with the Subcommittee on Reference Materials in Chemistry and with the International Confederation for Thermal Analysis (ICTA). A report is expected at the next commission meeting which will be held during 1990.

Dr M. B. Ewing (UK) and Prof. E. Wilhelm (Austria) were asked to explore the feasibility of a project dealing with the nomenclature of phase diagrams with particular reference to vapour–liquid and liquid–liquid equilibria. The Commission on High Temperature and Solid State Chemistry (II.3) should be informed about this. A report is expected at the next commission meeting.

The 11th IUPAC Conference on Chemical Thermodynamics will be held in Como, Italy, 27–31 August 1990. The commission actively assists in the arrangements of conferences in this series.

Thermodynamic data

The work of the Subcommittee on Thermodynamic Data falls under three headings.

1. *London Project Centre*

Work on the *International thermodynamic tables of the fluid state* is being carried out at the IUPAC Thermodynamic Tables Project Centre, London, UK. Volume 10 on *Ethylene* was published by Blackwell Scientific Publications in November 1988. It is the first volume prepared by computer typesetting at the centre in the form of camera-ready copy.

It is hoped that the experience gained will lead to more rapid publication of future volumes. The draft of the text of Volume 11 on *Fluorine* is completed and publication is expected soon. The final reports on *Sulphur hexafluoride* (Volume 12), and *Methanol* (Volume 13) are expected in 1990.

Work at the UK National Data Service Centre has continued and led to a consistent formulation of the properties of air as a mixture. The funding of the centre beyond December 1989 is uncertain although hopeful.

2. *Critical compilations*

Significant progress has been made in both the projects on critical compilations which were approved in Boston, 1987.

In the project 'Critical compilation of vapour liquid critical properties', the data compilation has been completed and the project is at the stage where members of the working group will be checking and assessing actual data.

Furthermore, data collection is completed and data evaluation and correlation are now being carried out in the project 'Critical compilation of heat capacities of pure liquids'. The material will probably fill two volumes, with the first volume ready for publication in 1991.

The subcommittee proposed to initiate a project on 'Critical compilation of activity coefficients at infinite dilution in non-electrolyte mixtures'. The

Gerd Olofsson (Chemical Centre, Lund) is secretary of the Commission on Thermodynamics and one of the coordinators of the project on 'Definitions of activities and related quantities in chemical thermodynamics'. Right: calorimetry at the Chemical Centre in Lund.

coordinator will be Prof. V. Dohnal (Czechoslovakia). The commission approved the project which is expected to be completed in 1993.

A feasibility study has been made on a 'Critical compilation of excess heat capacities of liquid non-electrolyte mixtures'. During the subcommittee meeting the authors were asked to answer questions raised by members and to prepare a revised proposal.

3. *1-Alkanol*-n-*alkane mixtures*

This project is progressing very satisfactorily. The objective is to determine an internationally agreed set of recommended data on low pressure vapour–liquid equilibria and related properties for binary 1-alkanol + *n*-alkane mixtures. The final report is expected in 1991.

Transport properties

The continuing growth in membership of the Subcommittee on Transport Properties and the regular attendance at the annual meetings show the growing interest in the work of this subcommittee.

At the meeting in Washington in 1988, some 25 people attended and 13 scientific presentations were made. The number of people present in Lund was slightly smaller but the number of presentations was the same.

The subcommittee continues with three projects: the MIDAS database in Stuttgart, FRG; the preparation of standard reference data for the transport properties of fluids; the establishment of wide ranging correlations for transport properties.

The output of the subcommittee continued to expand with publications in the *Journal of Physical Chemistry Reference Data*. At the time of the report there were some 23 published papers and another 22 were in preparation.

Prof. B. A. Grigoryev (Grozny Petroleum Institute, USSR) accepted an invitation to become a corresponding member of the subcommittee. This was of special significance in view of the large volume of Russian literature that exists in the field.

The third draft of the report on 'Kinetics of composite reactions in closed and open-flow systems' prepared by Prof. Villermaux was also discussed. It is now ready for submission to IUPAC and for publication after minor corrections. This report might be considered as an appendix to the glossary.

The Subcommittee on Gas Kinetics Data Evaluation for Atmospheric Chemistry (chaired by Prof. J. A. Kerr) has prepared a major evaluation of kinetic and photochemical data for atmospheric chemistry. This updates and extends the series of evaluations prepared by a CODATA task group (now disbanded). The database consists of data sheets for some 365 elementary gas-phase reactions which are important in modelling the chemistries of both the stratosphere and troposphere. This evaluation has been peer reviewed and published in the *Journal of Physical and Chemical Reference Data* (Vol. 18, No. 2, pp. 881–1097, 1989). It consists of a critical assessment of the literature data available for each reaction together with recommended values of the rate parameters and the error limits to be assigned to each recommendation (see *CI*, Vol. 12, No. 2, pp. 71–72, 1990).

Holger Crafoords Ekonomicentrum where many of the Lund General Assembly commission meetings were held.

Chemical kinetics

The Commission on Chemical Kinetics held its third meeting in Lund under the chairmanship of Prof. J. Villermaux (France) in the absence of Prof. K. J. Laidler (Canada).

The fourth draft of the *Glossary of terms used in chemical kinetics including reaction dynamics* prepared by Prof. Laidler was discussed in detail. A final draft, including some modifications, is in preparation and will be submitted for consideration by IUPAC. It is possible that the glossary will be combined with glossaries produced by the Commissions on Photochemistry (III.3) and Physical Organic Chemistry (III.2).

A list of 'hot spots' and trends in chemical kinetics was considered and revised.

Following further discussion on the subject of 'rate controlling step' it was agreed that this topic should not be considered separately but would be included in the glossary.

Dr Flynn presented a brief report on the activity of the International Confederation for Thermal Analysis.

Meetings were held with Commissions III.2 and III.3 with the aim of exchanging information and establishing cooperation especially in the area of combining glossaries.

Future projects were discussed by the commission. Two of them lend themselves to 'horizontal cooperation' within the Physical Chemistry Division:

1. *Kinetic data evaluation for atmospheric chemistry with extension to polar stratospheric cloud chemistry and reactions involving ice particles* (Prof. J. A. Kerr). This project is especially important in relationship to the 'ozone layer' and 'ozone hole' problems. Possible co-operation is envisaged with the Commission on Colloid and Surface Chemistry including Catalysis (I.6) in respect of the study of heterogeneous reactions involving solid particles.

A joint meeting with representatives of the Commission on Atmospheric Chemistry (VI.4) will be organized to explore the possibility of co-operation in modelling physical and chemical processes in the atmosphere.

2. *Computer databases on chemical kinetics* (Profs. E. T. Denisov, Y. N. Molin and J. A. Kerr). This project aims to establish a list of databases existing in different countries, and to promote exchange of information between them. It will be carried out in cooperation with the Committee on Chemical Databases.

Two other projects will be developed within the commission.

3. Preparation of a monograph on *Ultrafast processes* for the series *Chemistry for the 21st century*. Phenomena in both condensed phases (Prof. Molin) and in the gas phase (Prof. I. Tanaka) will be considered.

4. *Bibliography of monographs, manuals, handbooks and reviews on chemical kinetics* which have been published in different countries between 1971 and 1991 (Prof. Denisov).

J. Villermaux

LUND

Electrode surfaces

The importance of detailed knowledge of the electrode surface and the electrode/solution interface is now becoming more fully appreciated within the scientific community. This knowledge makes an impact on industrial electrochemical processes such as electrosynthesis, electrochemical purification of waste streams and of the fabrication of sensors and semiconductor devices.

The Commission on Electrochemistry (I.3) has ongoing projects concerning such fundamental measurements as impedance and has initiated a project on *in-situ* spectroscopic methods which will

Commission on Electrochemistry at Lund.

provide complementary information about the nature of electrode reactions. A system of classification of electrode reactions is also being developed. The real electrode surface area is a very important parameter and a wide range of technologies has been employed for its measurement. Commission I.3 has prepared a report critically evaluating the current methodology.

Members of the commission have been active in assisting other organisations such as the International Organization for Standardization (ISO) on matters of corrosion and the International Organization of Legal Metrology (OIML) on conducting measurements.

George S. Wilson

Colloid and surface chemistry including catalysis

At Lund the Commission on Colloid and Surface Chemistry (I.6) including Catalysis heard that several projects were in their final stages prior to publication, that is, either they have been submitted or they were about to be submitted to the Interdivisional Committee on Nomenclature and Symbols (IDCNS). These included projects on the following topics.

- Experimental techniques in surface chemical physics
- Electrified interfaces in aqueous dispersions of solids
- *Manual on catalyst characterization: terminology*

The 'sister' project to the third project above — *Manual on catalyst characterization: methodology* together with projects on 'characterization of porous solids' and 'thin liquid films and layers' were all progressing excellently.

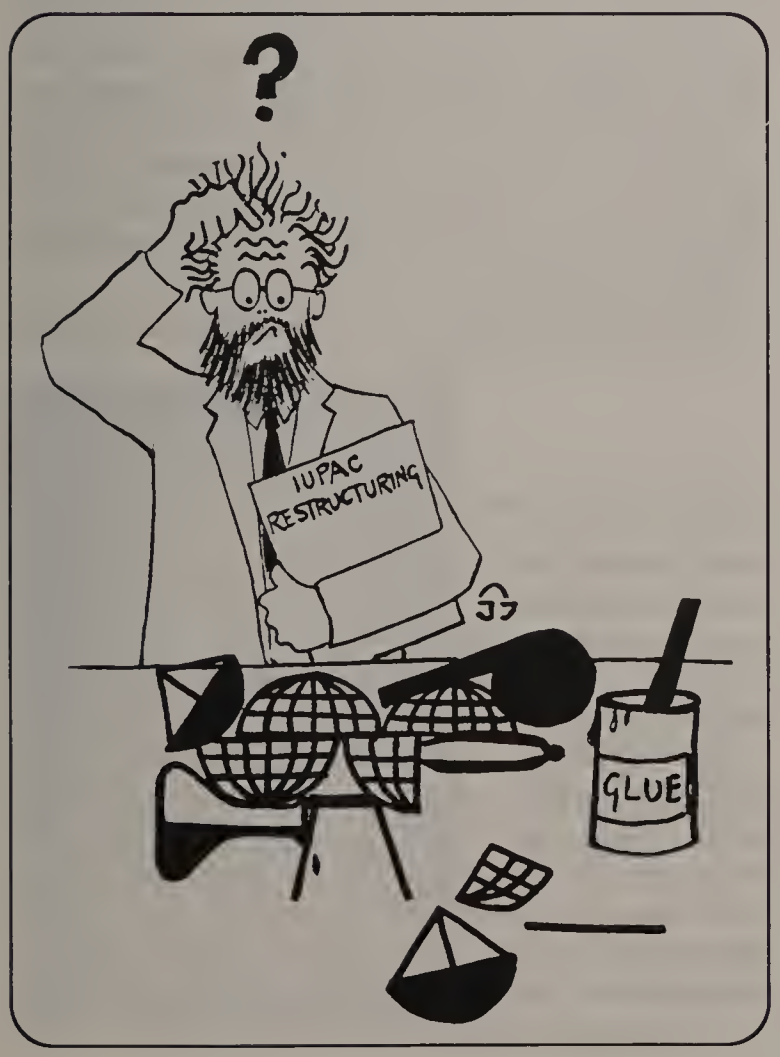
Feasibility studies are to be initiated on two projects in line with the new divisional philosophy of broader 'horizontal' type projects. These are:

Commission I.6 Chairman Prof. Ken Sing (left) and Secretary Dr Brian Vincent at Lund.

1. Role of surface and colloid chemistry in environmental protection; and
2. Surface chemical problems in the development of advanced materials.

Brian Vincent

LUND



Inorganic nomenclature

At its meeting in Lund, 5–10 August 1989, the Commission on Nomenclature of Inorganic Chemistry (CNOC, II.2) concerned itself principally with the elaboration of projects for the coming few years, in order to keep pace with the rapidly progressing field which it serves.

The commission was happy to learn from Blackwell Scientific Publications that Red Book Part I (the new revision of the 1970 IUPAC recommendations) will soon be available to the public. (*Ed:* The book was published in February 1990). The commission also noted with satisfaction the growing acceptance by the chemical community of the 1–18 column numbering of the periodic table.

Having specified in 1988 that Red Book Part II is designed to deal with more specialized areas of inorganic nomenclature, the commission has now proceeded to (1) determine the focus of that volume on large structures and (2) examine, through working parties, the status of the various proposed chapters. Although already published as IUPAC documents, a number of them were found to need some re-editing and adaptation to make them conform with the latest nomenclature practices and with the style and spirit of Red Book I.

The document on the 'Nomenclature of inorganic ring and chain compounds' has been referred and revised and is ready for public examination. The document on 'Nomenclature of inorganic branched chain and polycyclic compounds' was approved and the publication process can now begin. Both will appear in Red Book II.

Nomenclature of organometallic compounds

Another subject of major concern during this meeting was the project on 'Nomenclature of organometallic compounds'. Historically, the seeds of this project sprouted in Section D of the Blue Book

(Nomenclature of organic compounds) prepared jointly in 1973 by CNIC and CNOC (Commission on Nomenclature of Organic Chemistry, III.1) in order to provide names of group 14 organometallic compounds and organocompounds of phosphorus and boron, in addition to a number of other subjects of mutual interest to the two commissions.

With the great expansion of organometallic chemistry of the elements within the last two decades and with the trend to favour additive nomenclature whenever possible, it was considered timely to submit this document to an in-depth scrutiny. That preliminary process led the CNIC working party to focus over the past 2 years on the nomenclature of organometallic compounds of group 14. Various imperfections were discovered, such as the irrational amalgam of two or more systems of nomenclature in the same name, the multiplicity of alternative names with no basis of preferance and profligate selection of priority sequences within names.

Organometallic chemistry of the elements has expanded greatly over the last two decades. In-depth scrutiny of the nomenclature of organometallic compounds of group 14 has revealed various imperfections.

A joint working party with members from both CNIC and CNOC met for a full day on 3rd August in order to generate a concerted solution to the visible problems and to define a mechanism for further collaborations in critical areas of mutual concern. With the initial assignment to work with organo-element compounds of groups 14, 15 and 16, this group submitted proposals to both commissions whereby two joint working subgroups were constituted with the ultimate aim of forging a systematic name for each compound from each of the two favoured nomenclature systems (CNIC, additive nomenclature; CNOC, substitutive nomenclature).

Longer range goals involve (1) testing the nomenclature proposals throughout the periodic table (except for silicon and carbon) to determine both the practical and the desirable limits of each, and (2) to eventually generate a preferred name for any given case. The *ad-hoc* working party also

Tom Sloan prepared a document with numbering and unambiguous descriptions of the structures of a vast array of polyhedral metal clusters.

proposed a joint steering committee that would provide some guidance and supervision to the two joint working subgroups and serve other communication functions, including the generating and/or evaluating of other subjects for the development of documents by joint working subgroups. These proposals were warmly approved by both commissions and received the enthusiastic support of the Inorganic Chemistry Division which expressed the hope that this initiative will herald more inter-commission activites in the future,

A document entitled 'A structurally definitive descriptor and numbering system for metal cluster compounds' prepared by Mr Tom Sloan was discussed at great length. This document attempts to provide a vast array of polyhedral metal clusters with a numbered and unambiguous description of each structure. Sloan presented the system to several established authorities in a variety of areas of the field in order to profit from their reactions and contributions. Much input both from within and without the commssion will be incorporated in a revised manuscript.

The commission will next meet in Vienna, Austria from 23 to 28 July 1990.

Edmond Samuel

Solid state chemistry

When it met in Lund, the Commission on High Temperature and Solid State Chemistry (II.3) enriched by guests and observers, worked through its usual widely varied agenda with the emphasis this time on solid state chemistry.

Two significant publications prepared by commission members are Chapter 6 of the 'Red Book' which deals with the nomenclature of non-stoichiometric compounds and 'The melting temperatures of refractory oxides. Part II: Lanthanoid sesquioxides' (*PAC,* Vol. 61, pp. 1461–82, 1989). The commission's high temperature bibliography was also published during the year.

In addition, the commission noted that the proceedings from its topical conference HTERM in Rome in 1987 had been published in *High temperatures – high pressures*. The commission also heard a report on the successful sequel held at Gaithersberg, USA, April 1989 for which two 500-page hard-cover volumes of proceedings were at galley proof stage. Commission II.3 agreed that future meetings would be at Orleans in 1991, Notre Dame (USA) in 1993 and Vienna in 1995.

The commission assessed results from two collaborative projects which it is directing with participation in each case by laboratories around the world. The first of these seeks to compare procedures and results of EPMA determinations of the composition of glasses. The second will evaluate the bulk ionic conductivities of some of the most useful and technologically important oxygen ion conductors.

Dealing with terminology and nomenclature, the commission noted that a second set of a further 36 terms for the characterization of carbon were currently well advanced in the IUPAC publication process as was a paper on the 'Nomenclature of graphite intercalation compounds'.

The commission also considered a near final draft of a paper on phase transition terminology and established a preliminary survey team to assess the need for terminology on the kinetics of solid state reactions. The commission reviewed a computer-based data bank on high temperature thermochemical data of elements, which will be published through the IUPAC Committee on Chemical Databases (CCDB), and a further computerized compilation of data on high temperature mass spectrometric ionization cross-sections which is nearing completion.

The commission was presented with an initial report by a task force established to put greater emphasis on solid state chemistry in basic academic education and to promote the earlier introduction of this field in the third level curriculum. A preliminary survey team was initiated to work in collaboration with the Committee on Teaching of Chemistry to seek ways to encourage the teaching of solid state chemistry at second level.

Finally, the commission will also participate in the new horizontal programmes of the Union. Commission Chairman, Prof. Rudi Metselaar, will also chair the Interdivisional Ad Hoc Subcommittee on Solid State Chemistry which will investigate the need for further expansion of IUPAC activities in solid state chemistry.

John Corish

John Corish (Trinity College, University of Dublin, Ireland) is Secretary of the Commission on High Temperature and Solid State Chemistry.

Photochemistry documents finalized

Documents on 'Methods for the determination of molar absorption coefficients of transient species in solution', 'Recommended reference materials for triplets' and 'Recommended methods of fluorescence decay analysis' were finalized by the Commission on Photochemistry (III.3) at Lund. The project 'Methods for production of radical ions for electronic spectroscopy in low temperature matrices' was advanced to near completion.

A working party was established to expand the *Glossary of terms used in photochemistry* (see *PAC*, Vol. 60, No. 7, pp. 1055–1106, 1988) to include terms on electron transfer, photochemistry and photosynthesis. The work would be coordinated by a new titular member. Charge of the project 'Educational aspects of photochemistry' was transferred to a new coordinator and cooperation with the Committee on Teaching of Chemistry was initiated to optimize the outcome of this work.

Contacts were made with the Steering Committee for Biophysical Chemistry and collaboration with the Commission I.6 Subcommittee on Thin Films was continued. Discussions of common projects, especially glossaries, were held with the Commissions on Chemical Kinetics (I.4) and Physical Organic Chemistry (III.2).

In response to the request for restructuring of activities, the commission has strengthened its interdisciplinary interactions. Through the extensive use of large working parties of limited duration, the commission has acted to accelerate the completion of projects.

In addition to expansion of the glossary, the commission will work on a new project, 'Recommended reference materials for the determination of molar absorption coefficients of transients other than triplets'.

The next meeting will be held in Warwick, UK, 22–28 July 1990 during the 13th IUPAC International Photochemistry Symposium.

David F. Eaton

Compendium of macromolecular nomenclature complete

During their 1989 meeting in Lund, the Commission on Macromolecular Nomenclature (IV.1) reviewed and approved the introductory material for the first edition of *Compendium of macromolecular nomenclature* – also known as the 'Purple Book'.

With the publication of three documents in *PAC* this year, all nine documents dealing with macromolecular nomenclature and terminology to be incorporated into the compendium are now ready. They will be combined with the introductory material to submit for publication. Included in the compendium are chapters on terminology including basic definitions, stereochemical definitions and notation, definitions of properties of polymers in solution, and definitions related to crystalline polymers, along with chapters on the nomenclature and classification of regular, single-strand organic and inorganic polymers, nomenclature of copolymers and recommendations for the use of abbreviations for polymers.

Publication of this book, anticipated to take place in 1990, should do much to improve the awareness of the polymer community about the existence of systematic nomenclature and definitions related to polymers.

Dr Claudine Noël (France) is a titular member of the Commission on Macromolecular Nomenclature.

In other business, the commission made considerable progress in nine other existing projects. Of particular note are three projects, 'Ladder polymer nomenclature', 'Irregular polymer nomenclature', and 'Basic classification and definition of polymerization reactions', now thought to be sufficiently advanced, once minor revisions are completed, to be exposed to comment by outside experts.

Three other documents, dealing with the mechanical properties of polymers, methods to represent polymers by chemical formulae, and nomenclature for networks and non-linear polymers, may be ready for review by outside experts following extensive revision and approval by the individual working parties. The commission hopes to submit these documents to the Interdivisional Committee on Nomenclature and Symbols in 1990.

The remaining three projects, dealing with stereochemistry of polymerization reactions, liquid crystals, and a revision of the basic definitions related to polymers, are either in the very early stages of preparation or require extensive revision and review.

The commission proposed the initiation of two new projects: a revision of the 1976 document 'Nomenclature for regular single-strand polymers' and a project to develop terminology related to the degradation, ageing, and chemical modification of polymers. The latter is considered to be appropriate in view of world-wide concern over chemicals in the environment. During the next year, the working parties will define the scope of these projects.

As noted above, the commission has published in *PAC* this year: 'Definitions of terms relating to individual macromolecules, their assemblies, and dilute polymer solutions' (*PAC,* Vol. 61, pp. 211–241, 1989), 'Classification of linear single-strand polymers' (*PAC,* Vol. 61, pp. 243–245, 1989), and 'Definitions of terms relating to crystalline polymers' (*PAC,* Vol. 61, pp. 769–785, 1989).

The next meeting of the commission will be held in Canada during the first week of July 1990.

William J. Work

LUND

Spectrochemical analysis nomenclature, symbols and units

The principal development in recent years is the strong shift in the work of the Commission on Spectrochemical and Other Optical Procedures for Analysis (V.4) from atomic spectroscopy towards laser-based molecular spectroscopy.

Commission V.4 has seen several new projects, begun 8–10 years ago, come to completion. These include the divisional book projects on 'Water analysis', 'Ultraviolet and visible molecular absorption' and the 'Preparation of material for analytical atomic spectroscopy', which have been published in the last 2 years.

Other documents in their final stages towards publication are those on 'X-ray nomenclature', 'Instrumentation for the disperson and isolation of radiation', 'Electrothermal atomization' and 'Chemical vapour generation'. The complexities of the review system has led to unfortunate delays in their completion.

Lund University.

Considerable efforts have been put into the preparations of the draft text for 'Radiation detectors'. This was carefully reviewed and corrections made to enable a final draft to be prepared. It is hoped that this important document, whch will be the last in the series on analytical systems, will be published before the next general assembly.

The development of the laser as a primary source has led to the development of new analytical methods in both atomic and molecular spectroscopy. Their importance was recognized some years ago by the commission and projects were established to provide suitable nomenclature in the relatively early stages of development.

As these projects developed, it became obvious that their complexity, especially in laser-based molecular spectroscopy, demanded different facets of this field. These include optical and non-optical detection and scattering which will be worked on in parallel with the document on the fundamental principles of this topic.

The result of this development has brought about a stronger representation by molecular spectroscopists in both titular and associated ranks of the commission.

Following the comments made in the review of the activities of the commission, it was suggested that more attention should be given to practical methodology, especially with regard to measurements and techniques referred to but not described in documents on nomenclature already published. This was favourably received and proposals for the writing of monographs noted. It was also suggested that analytical methods, already established by other agencies in different countries, should be collated and reviewed.

A small task group was set up to collaborate with other commissions and organizations, to establish what has been and could be done to establish a comprehensive molecular spectra databank. The requirements and guidelines for such a databank would be investigated.

Joint meetings with the Commissions on Microchemical Techniques and Trace Analysis (V.2) and Analytical Nomenclature (V.3) were held and possible areas of overlap discussed. Collaboration on the project on surface analysis will continue.

Allen M. Ure

Stability constants

At the Lund meeting of the Commission on Equilibrium Data (V.6), Dr Pavel Valenta reported major progress on critical evaluations and computer-assisted compilation of stability constants. A seven-chapter, 250-page manuscript on 'Interpretation of metal complex equilibria with organic polyelectrolytes', has been revised and will be submitted to the Analytical Chemistry Division Committee for final approval.

A new 100-page critical survey on metal–nucleotide complexes, completed by Prof. Arthur E. Mantell, has been reviewed and submitted to the division committee. The survey is expected to be a valuable basis for those working in the field of metal-DNA and nucleotide systems.

Methods of compiling stability constant data have been discussed and improved further by the use of a computer program for efficient data input. Data collection has been strengthened in China and the South-east Asia region through a literature survey by Dr M. Zhang (China). The form of publishing the collected data was also discussed.

Five new projects covering essential aspects of chemical solution and environmental analytical phenomena have been approved by the commission and presented at the division meeting.

Osamu Yamauchi

Impact of biotechnology

The Commission on Biotechnology (VI.2) is now working at full strength on chemically relevant aspects of biotechnology after a period of rebuilding which started at the 33rd IUPAC General Assembly held in Lyon in 1985. Major efforts have been directed towards new developments in biotechnology, particularly with the rapid growth of molecular biology in the last decade.

The commission has completed and submitted for publication a glossary of terms in common use in biotechnology. The glossary aims to make this biotechnology more accesssible to chemists. in addition, an ongoing project of the commission concerns the inter-relations of biotechnology and organic chemistry. A series of review papers is being published in *PAC* on topics at this critical interface.

In its work, the commission is attempting to span the biotechnology field from its origins in the fermentation industry to its more recent focus on

molecular biology. For example, two other projects completed are related to more traditional industrial biotechnological processes. One of these concerns terms, symbols and units related to microbial processes.

Several feasibility studies were launched when the commission met at the Lund General Assembly. They illustrate the maturing of this restructured commission. For example, the commission will tackle nomenclature problems in DNA synthesis and sequencing that derive from methodological limitations and that may have a major impact on the interpretation of data from the human genome project.

The commission will also carry out a feasibility study to begin organization of a symposium on 'Biotechnology and the environment'. It is hoped that such a symposium can provide the public with a realistic picture of the impact of biotechnology on society and can dispel many misconceptions.

A high point at Lund was the open meeting of the commission. Three excellent short presentations gave an overview of chemical aspects of biotechnology of potential interest to IUPAC. These talks were followed by a lively discussion that demonstrated clearly the interdisciplinary interest in biotechnology.

The commission recognizes the urgent need for effective collaboration between IUPAC bodies in this area and will follow up contacts made in Lund. In addition, the commission welcomes any other comments on proposals for joint projects.

The next meeting will be held in Strasbourg, France, 9–11 August, 1990.

Lila M. Gierasch

Oils and fats

The 42nd meeting of the Commission on Oils, Fats and Derivatives (VI.3) was held at the University of Lund, Sweden, with 32 delegates representing 17 countries. The meeting was formally opened by the chairman, Dr Joyce Beare-Rogers, who paid tribute to Dr Östen Levin and Prof. Ragnar Ohlson (Swedish associate members) for the fine programme of social activities they had arranged for the delegates.

Reports submitted from the coordinators of the commission's working groups were discussed. These covered the 1988/9 studies of methods of determination of: individual triglycerides by reversed-phase HPLC; phospholipids by HPLC; fatty acids by capillary GLC; iodine value; acidity; and peroxide value. It had been successfully demonstrated that carbon tetrachloride, used in the determination of iodine value, could be replaced by a mixed solvent of cyclohexane and glacial acetic acid without loss of precision, except in the case of hydrogenated oils. The results obtained with the method for individual triglycerides by HPLC and a further study would be arranged.

The following items of work, which were first proposed at the 1988 St Andrews' meeting, were formalized into projects: determination of contaminants in oils shipped in bulk; halogenated solvent residues in olive oils; precision data for iodine value (hydrogenated oils) and peroxide value; phosphorus in oils; and lipid oxidation. *Ad-hoc* groups were set up to look at methods for the determination of arsenic, cadmium, selenium and mercury, and for the determination of chlorophyll. Cooperation with the Commission on Food Chemistry (VI.1) for assessing suitable methods for lipid oxidation assessment would continue.

The commission was informed that the number of methods which had now been standardized since the publication of the 7th edition of *Standard methods for the analysis of oils, fats and derivatives* was sufficient for arrangements to be put in hand for issuing the first supplement.

The majority of delegates were accommodated at the Järavallen Conference and Country Club situated on the attractive west coast of Sweden some 33 km north of Lund. On Friday afternoon (11 August 1989) delegates were taken on a tour of Lund following a very instructive and enjoyable visit to the factory complex of Tetrapak.

The next meeting of the commission is expected to be held in Switzerland during August 1990. The new chairman and secretary of the commission for 1989–91 are W. D. Pocklington and P. W. Hendrikes, respectively.

W. Dennis Pocklington

Atmospheric chemistry

The Commission on Atmospheric Chemistry (VI.4) has completed work on the *Glossary of terms in atmospheric chemisty* and on the *Inventory of current tropospheric sampling programs worldwide*. These reports are the first products of the commission since its revitalization in 1985.

The glossary is an extensive document, treating all aspects of atmospheric chemistry and so, by necessity, has a very wide scope, ranging from chemistry to meteorology. The conclusions of the inventory are that planning of network lay-outs,

Jack Calvert, chairman of the Commission on Atmospheric Chemistry.

quality assurance, quality control and data treatment could and must be optimized to provide necessary insight into present environmental problems. A first draft of an extensive inventory of measurement methods for workplace atmospheres was presented and discussed at the commission meeting in Lund.

The commission is collaborating with the CHEMRAWN Committee in the preparation of the CHEMRAWN VII conference. This conference will address the central role of atmospheric chemistry in understanding the cause of environmental problems such as acid rain, ozone depletion and the 'greenhouse effect'. Understanding the underlying mechanisms which cause these problems is a first and necessary step in the formulation of effective counter measures.

A first draft of a report on preferred units to be used in atmospheric chemistry research was accepted by the commission at Lund.

The commission plans to start a number of new projects. The application of diffusion tubes, which are inexpensive devices for monitoring air pollution levels, will be investigated. Diffusion tubes offer good possibilities for pollution control in less developed countries. They also fulfil a useful role in monitoring air pollution in industrialized nations.

Teaching atmospheric chemistry, both to the general public and to specialists, will be studied in order to supply good courses and study material, especially to less developed countries.

The commission will try to organize a workshop on the uncertainties in the predicted trends of air pollutant concentrations. These concentrations are very important in assessing environmental problems, such as climatic changes which could be caused by increased levels of air pollution.

Commission members will prepare a series of articles, devoted to local environmental problems in various countries with the aim of publishing them in *CI*.

Serious gaps in knowledge exist regarding data on the emissions of pollutants for a number of countries. These data are essential for modelling global atmospheric changes. IUPAC's good relations with many of these countries hopefully will be instrumental in procuring information on these emissions.

Sjaak Slanina

Clinical chemistry

The Clinical Chemistry Division Committee and its Executive Committee held several meetings on the Sparta Campus of the Institute of Science and Technology, University of Lund from 8 to 14 August 1989.

The meetings were those of the Division Committee(s), 1987–89, the Executive Committee(s), 1987–89 and 1989–91, and the open meeting

Clinical Chemistry Division Secretary Dr Jorma Järvisalo at Lund.

of the division members. In addition, representatives of the division participated in various other IUPAC or interdivisional meetings.

The meetings were attended by about 30 members of the division, together with a representative of the International Federation of Clinical Chemistry.

A major task of the division officers has been to develop up-to-date operational guidelines and an information booklet, so as to improve the general efficiency of the division's activities. The other main task has been to make the best use of the division's skills and resources through setting clear objectives and modifying the structures and working methods of the divisional bodies. The intention is to fulfil the strategy which was outlined in the report of the divisional forward planning group (1988), subject to the overall programme for IUPAC which is being developed by President Koptyug.

It is planned that the Clinical Chemistry Division will encompass core activities related to measurement technology (quantities and units standardization, general and specific protocols, including chemical safety), together with projects which will link into horizontal IUPAC programmes concerned with the environment and biosciences, i.e. health (protection and promotion) and disease (prevention, diagnosis and therapy). To meet these objectives there will need to be systematic adaptation of the divisional bodies. Their future activities will correspond to two strong subdivisions (measurement technology and health/disease applications) with new working procedures.

In the meantime, all current projects, as appropriate, will be completed, with early deadlines, to open the way for the division to interact effectively with new horizontal programmes.

The next division committee meeting will be held on the occasion of the 36th General Assembly, August 1991. The Division Executive Committee will meet again in June 1990, Helsinki, in conjunction with the COMTOX Symposium on Trace Elements.

Jorma Järvisalo

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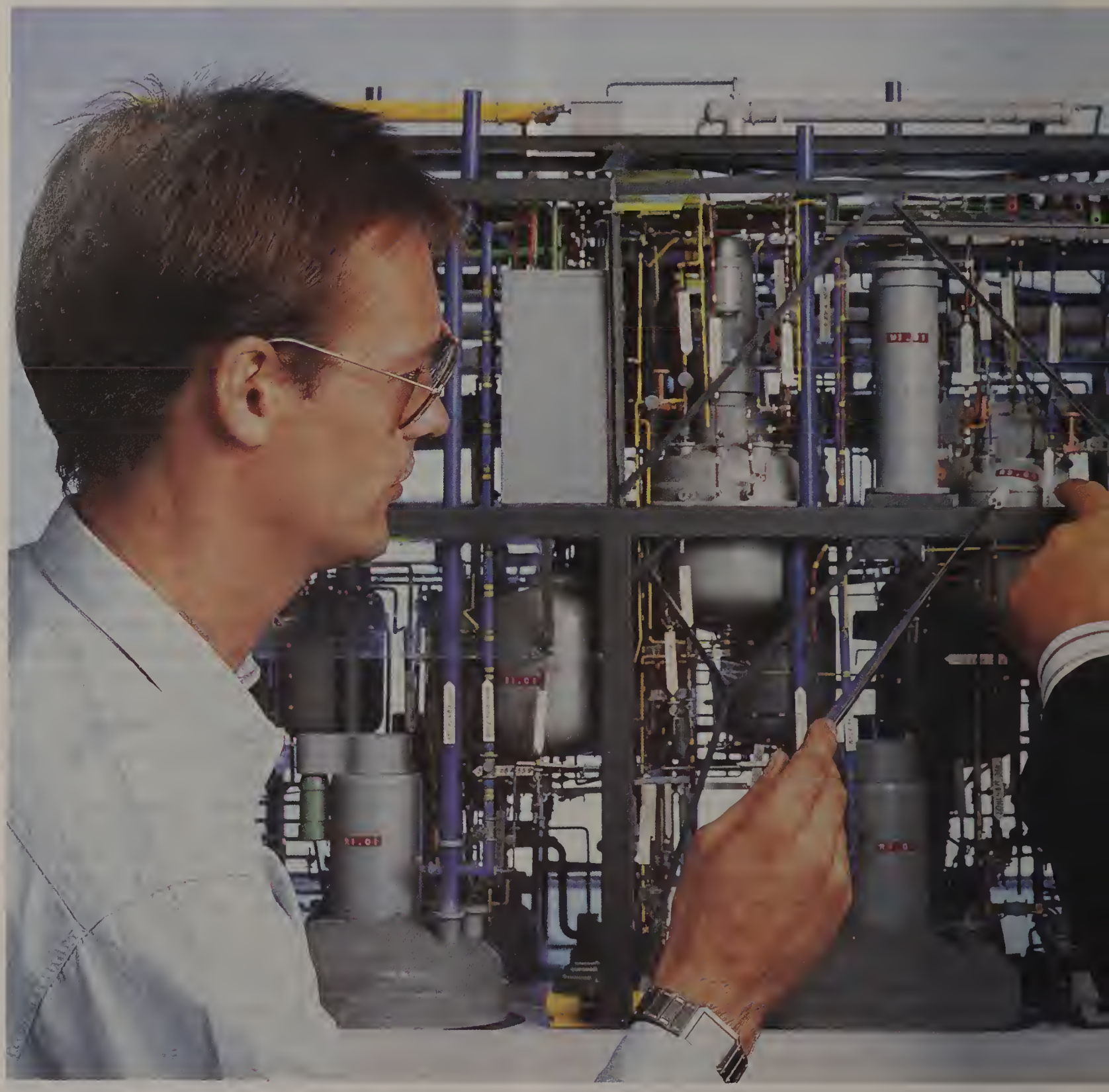

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Provisional Recommendations

IUPAC seeks your comments

In this section we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *PAC* and synopses of these are published in *CI* as recent reports.

If you would like to comment on the provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the IUPAC Secretariat. The most up-to-date list of national/regional centres appeared in *CI,* Vol. 11, No. 2, p. 67, 1989.

Real surface area measurements in electrochemistry

Electrode reaction rates and most double layer parameters are extensive quantities and have to be referred to the unit area of the interface. Knowledge of the *real* surface area of electrodes is therefore needed. Comparison of experimental data with theories or of experimental results for different materials and/or from different laboratories to each other is physically groundless without normalization to unit *real* area of the electrode surface.

Different methods have been proposed to normalize experimental data specifically with solid electrodes. Some of them are not sufficiently justified from a physical point of view. A few of them are definitely questionable.

The purpose of this document is to scrutinize the basis on which the various methods and approaches rest, in order to assess their relevance to the specific electrochemical situation and, as far as possible, their absolute reliability. Methods and approaches are applicable to (a) liquid electrodes, (b) polycrystalline and single crystal face solids, and (c) supported, compressed and disperse powders. The applicability of the various techniques to each specific case is to be verified.

After an introductory discussion of the 'concept' of real surface area, 15 methods, 11 applied *in situ* and four *ex situ,* are scrutinized. For each of them, after a description of the principles on which it is based, limitations are discussed and recommendations are given.

Comments on the document should be sent by 31 December 1990 to: Prof. S. Trasatti, Dipartimento di Chimca Fisica ed Elettrochimica, Universitá di Milano, Via Venezian 21, I-20133 Milano, Italy.

The Stockholm Congress

The 32nd IUPAC Congress, organized by the Swedish National Committee for Chemistry of the Royal Swedish Academy of Sciences, took place in Stockholm, from Wednesay 2nd to Monday 7th August 1989. The scientific programme consisted of plenary lectures and seven parallel sessions of oral presentations and posters.

The scope of IUPAC congresses are traditionally very broad. They are intended to counterbalance the increasing specialization in chemistry that tends to separate different areas of research. The aim of the congresses is to give chemists an overview of the state of knowledge in neighbouring fields whilst at the same time dipping into their own research specializations.

The scope and aims of the 32nd IUPAC Congress in Stockholm were no different from those of previous congresses. In one respect, however, the scientific programme of the 1989 congress broke with tradition. The time-honoured subdivisions of physical, inorganic, organic, analytical, applied chemistry and so on were not used. Instead, its seven sections each dealt with a timely scientific topic, selected for its industrial and social relevance. They were as follows:

1. Large-scale separation of biological macromolecules, cells and particles;
2. Atmospheric and marine chemistry;
3. Chemical communications and chemical interation between organisms;

The 32nd IUPAC Congress was held at the Stockholm International Congress Centre. The City of Stockholm and Stockholm Country Council invited the participants to a reception at Stockholm City Hall (right). This is situated on the waterfront of Riddarfjärden and is the venue of the annual Nobel banquet.

4 Solid state chemistry — frontiers in the chemistry of inorganic materials;
5. Structure and dynamics of macromolecules;
6. Electron transfer reactions; and
7. Chemistry and biochemistry of bile acids.

The congress included plenary lectures, for example, by Martin Fleischmann (UK) on 'Solid state fusion?' and by Nobel Laureates Johann Deisenhofer (USA) on 'The three dimensional structure of the photosynthetic reaction center from *Rhodeopseudomonas virulis'* and J. Georg Bednorz (Switzerland) on 'Superconducting oxides'. There was also a full programme of oral and poster contributions and press conferences.

A break in the scientific programme on Friday 4th August gave participants the opportunity to see more of Stockholm and its surroundings. Excursions included trips to Ytterby quarry and the Bullerö National Park and to the Reijmyre glassworks.

The congress was opened by congress president Sture Forsén (Sweden). He pointed out that 1200 chemists from 52 countries had registered as active congress participants and informed the audience that the congress coincided with the 250th anniversary of the Royal Swedish Academy of Sciences.

Birgitta Dahl, Minister of Environment and Energy in Sweden, welcomed the participants and said that

Four of the congress organizers, from left: Peder Kierkegaard (chairman of the organizing committee), Birgitta Eriksson and Ebba Wahlström (general secretaries) and Sture Forsén (president).

Nobel Laureate Johann Deisenhofer (USA) was one of the plenary lecturers at the congress.

she was pleased to note that the environment was one of the themes of the congress. The text of her address will appear in the next issue of *CI*.

IUPAC president Valentin Koptyug (USSR) presented the greetings of the Union. He congratulated and thanked the Congress Coordination and Scientific Committees for the efficient organization of the congress and an exciting scientific programme and offered his best wishes for the success of the congress. He then informed participants about the objectives and activities of the Union including its CHEMRAWN (CHEMical Research Applied to World Needs) programme, its publications and its affiliate membership programme. Furthermore, he stressed the increasing involvement of IUPAC in environmental matters.

The following reports provide just a taste of some of the numerous contributions to the congress. They are based on the abstracts and synopses provided by the contributors.

President Valentin Koptyug (USSR) presented greetings of the Union at the opening ceremony.

IUPAC STOCKHOLM 1989

Superconducting oxides

Nobel Laureate J. Georg Bednorz (Zürich Research Laboratory, Switzerland) delivered a plenary lecture on 'Superconducting oxides' at the Stockholm congress. In his lecture, he presented an overview of the chemistry and structural properties of the layer CuO-based high T_c superconductors.

Nobel Laureate J. Georg Bednorz at the Stockholm congress.

He pointed out that proper cation combination allows new superstructures with ordered oxygen vacancies to be tailored, leading to the introduction of carriers of the hole nature. Thallium compounds, exhibitions the highest T_c of 125 K to date, show a triple layer combination of CuO-polyhedra, that is, pyramidal and square planar.

Systematic research, beginning with $KNiF_4$-type compounds, has led to the discovery of new structures with single layers of only pyramidal or square planar coordinated copper, the latter showing electronic conduction.

In his overview of current experimental knowledge, Bednorz included significant experiments on single crystals and the new macroscopic properties such as microwave absorption and the glass-like magnetization behaviour. He discussed applications in the light of the latest experimental results.

Stockholms Skärgard, the Archipelago, is one of the largest in Europe, consisting of about 24 000 islands. During the congress a number of participants visited two of these islands by boat.

Their first port of call was *Resarö,* location of *Ytterby* quarry. This lode of quartz and felspar was discovered in 1750 and mined until 1930. Lanthanoid chemistry grew from the find of the rare black mineral ytterbite here by Swedish Army Lieutenant Carl Axel Arrhenius in 1750.

In time it proved to contain several of the rare earths and Ytterby subsequently gave its name to no less than four elements: yttrium, erbium, terbium and ytterbium. The quarry, with its water filled galleries and dump heaps is now a protected area open to visitors only on special occasions.

After visiting the quarry, participants resumed their cruise to Bullerö, an island which is the centre of Bullerö National Park. The park consists of 100 islands and is under the protection of the Archipelago Foundation.

Participants (centre right) examine rocks at *Ytterby* quarry on the island of *Resarö* (centre left) before continuing their boat cruise to *Bullerö* (right).

Downstream processing in biotechnology

In her plenary lecture on 'Downstream processing in biotechnology' Maria-Regina Kula (Heinrich-Heine University, Düsseldorf, FRG) said that biotechnological processes, like chemical production processes, have two major parts: biosynthesis and isolation of product.

Genetic engineering has brought dramatic changes and improvements with regard to product synthesis, especially for proteins. To translate this potential into new production processes, downstream operations are presently the limiting step. For therapeutic proteins, isolation and purification may contribute up to 90% to the manufacturing cost.

Maria-Regina Kula.

Kula added that recovery of product usually proceeds in four major stages.

- Primary separation: separation of cells from spent fermentation broth and removal of cell debris from solubilized products after disintegration
- Enrichment of products
- High purification
- Final concentration

At each stage different unit operations may be employed. This illustrates some of the difficulties encountered in downstream processing. Besides, biotechnological products have to be isolated from complex mixtures. Often properties of cells and byproducts limit performance. Therefore selection of production organism, gene construction as well as fermentation conditions have a significant influence on downstream unit operations, which should not be neglected.

For final purification differences in size, charge or specific interactions are exploited. For proteins often more than one chromatographic step is necessary and the sequence of operations may be important. The goal is to isolate the desired product in high yield with a minimum number of steps and in quality sufficient for the intended application. Process design has also to meet economic criteria.

In this context, Kula discussed advances in process technology for the recovery of biologically active proteins.

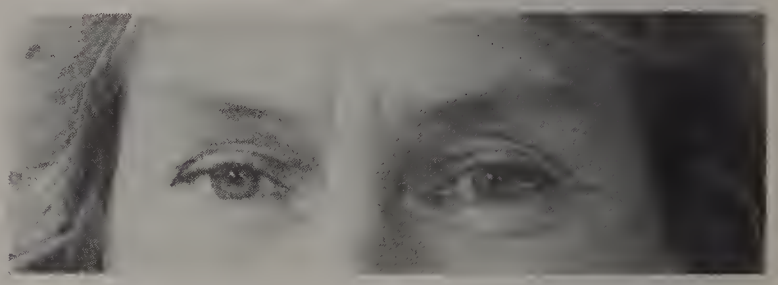
What triggers vision?

'What triggers vision?' asked Koji Nakanishi (Columbia University, USA) in his plenary lecture on 'Bio-organic studies on the mechanisms of visual transduction and light adaption'.

Nakanishi reminded the audience that sensory photoreceptors are widely distributed in nature. They include the eyes of vertebrates, the photoreceptors of bacteria and single eye spots of unicellular microorganisms responsible for their phototaxis. The pigments are made up of transmembrane proteins and retinal chromophores.

The structures of many photoreceptor molecules have been elucidated by genomic means, but the mechanistic aspects of photoreception is still very obscure on a molecular structural basis; these retinal proteins are also attracting great interest because of the similarity in their reaction pathways and those of ß-adrenergic receptors.

Nakanishi then presented an overview of the point charge models proposed for bovine, octopus, chicken and other visual pigments to account for their absorption maxima, which in turn are responsible for the vision of animals.



Human eyes discriminate a luminance span of about one billion to one.

The basic mechanism for visual transduction has always been considered to be *cis/trans* isomerism in the retinal moiety. However, the Nakanishi team at Columbia has found that the photoreceptor of the unicellular algae *Chlamydomonas* accepts a variety of retinals including those analogs in which specific double-bond isomerizations have been blocked. Moreover, they even respond to short acyclic aldehydes, including the saturated C_6 aldehyde, *n*-hexanal. The group are currently attempting to isolate the photoreceptor protein by gene cloning in order to secure sufficient quantities for more detailed binding studies.

Nakanishi pointed out that human eyes discriminate a luminance span of about one billion to one.

Koji Nakanishi and his group at Columbia University are currently attempting to isolate the photoreceptor protein by gene cloning in order to secure sufficient quantities for more detailed binding studies.

One mechanism for this adjustment in sensitivity is by the pupil. However, the pupil diameter can only adjust between 2 and 8 mm, which allows for only a 16-fold change in the area, or a range of only one log unit.

On the other hand, bleaching of rhodopsin leads to a mechanistically unknown process that depresses the photosensitivity by several orders of magnitude. This mechanistically unknown but important process is called bleaching adaption.

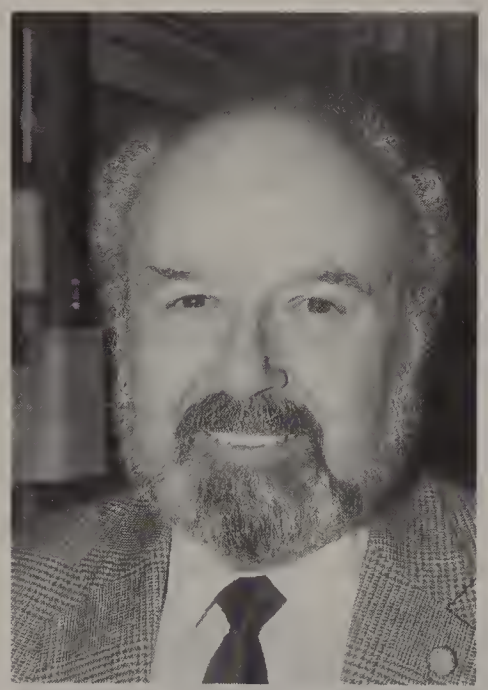
Nakanishi has found that incorporation of a retinal analog, having its 11-*cis* bond locked by seven-membered ring, into the eyes of salamander relieves this bleaching adaption, and thus provides us with a handle to investigate this little understood phenomenon.

Atmospheric and marine trace chemistry

One of the lectures presented in the section on atmospheric and marine chemistry was by IUPAC affiliate Fred Brinckman (National Institute of Standards and Technology (NIST), Gaithersburg, USA). The title of his lecture was 'Atmospheric and marine trace chemistry: interfacial biomediation and monitoring'.

Brinckman said that the past two decades have witnessed a major advance in laboratory and field analytical capabilities for the ultratrace elemental and molecular speciation of key metallic, metalloidal and organic species comprising the tremendous global fluxes between terrestrial and oceanic sources or repositories.

Special extensions of such monitoring capacities have additionally afforded new understanding of the atmospheric or aquatic interactive chemistry affecting longevity, transformation, volatilization and solubilization at crucial micrometric interfacial sites necessary to deal with favoured or inimical environmental consequences. Many reports now demonstrate that the significant mediation of such bulk global fluxes at these air-sea interfaces may depend on the key rate and transformation biopaths incurred at the real-time *in-situ* trace concentrations of essential and toxic elements derived from both natural and man-made sources.



IUPAC affiliate Fred Brinckman lectured at the Stockholm congress on ultratrace biotransformations of key elements in aquatic environments.

Research at NIST relating to ultratrace biotransformations of such key elements in aquatic environments has shown, along with independent confirmation internationally, that extensive redox dissolution, particulation, gasification of both metals and metalloids occurs biotically. This planetary phenomenon can act as a principal intensifier for such fluxes at the air–sea interface where primary microbiotic residence can exploit ensolation, aerobicity, nutrients and agitation, so

Biotransformations of trace concentrations of essential and toxic elements occur at the air–sea interface.

requiring on-site evaluation of trace chemistries' chief contribution to environmental detection, management and applications of extant global heavy element fluxes for future safety and industries.

Brinckman concluded by pointing out that probable megaton annual microbiotic production of halo-organics, methymetals and methylmetalloids, and latest discoveries of naturally occurring hydrides reveal the novel scope and prospects for 21st century technology.

IUPAC STOCKHOLM 1989

The odour language of insects

Female insects use specific odours in very small quantities to attract males of their own species. Such odours are called pheromones and consist of small numbers of different chemical substances in specific proportions. Biologists have, during the last 20 years, succeeded in identifying the structure of such pheromone components for a large number of insect species.

Odour molecules emitted by a female insect have to bind and interact with extremely sensitive receptor cells in the male antennae. ***(FAO photo by J. Van Acker.)***

There are hopes that pheromones may be used as pest control agents as an alternative to current insecticides. An alternative approach to pest control could be to attract insects into traps by pheromones or to disrupt communication between females and males. The advantages with pheromones in this context are that they are 'natural' and selective for a particular species.

In order to be perceived by the male insect, the odour molecules emitted by the female have to bind and interact with extremely sensitive receptor cells in the male antennae. A successful binding results in nervous impulses which tell the male that there is an interested female in the vicinity.

A group at the University of Lund, Sweden, led by Tommy Liljefors is conducting research on this topic. To learn more about insect language they are looking into the problem of why some molecules are active as pheromones while other similar molecules are inactive.

Liljefors's group is studying how the male receptor reacts to artificial pheromones. Using theoretically calculated properties of the test molecules they are trying to construct a model for the interaction between a pheromone molecule and its receptor. Such a model may be used to predict the pheromone activity of different types of molecules and also used to design new molecules with tailored properties, for instance, molecules which block the pheromone receptor.

At the Stockholm congress, Liljefors reported specifically on structure–activity studies on moth sex pheromones in his lecture in the section on chemical communication and chemical interaction between organisms. Moth sex pheromone components are extremely flexible molecules and the 3D-shape (conformation) of such a molecule when it is interacting with its biological receptor is far from obvious. In his presentation, he discussed a model for the interaction between a moth sex pheromone component and its receptor.

Structural aspects on composition in non-molecular solids

In the section on solid state chemistry — frontiers in the chemistry of inorganic materials — the Chairman of the Swedish National Committee for Chemistry, Arne Magnéli (University of Stockholm) presented the Arne Westgren Centennial Lecture. The lecture was entitled 'Structural aspects on composition in non-molecular solids'.

Magnéli pointed out that Arne Westgren (1889–1975) stands out as one of the leading figures of crystallographic research in inorganic chemistry in the twenties and thirties. In particular, he became the pioneer in applications of X-ray crystallography for studies of metals and alloy systems.

In the words of Sir Lawrence Bragg (1933) 'The development of the study of alloy structures will always be associated with Westgren's name. He commenced his investigations into the structure of iron and steel in 1921. Since then, many papers on alloy structures, and reviews of the nature of alloys,

Arne Magnéli presented the Arne Westgren Centennial Lecture at the Stockholm congress.

have appeared from his laboratory. His work has been characterized by the precision of its metallurgical technique, and the clearness of its powder photographs. He has been responsible, more than any other investigator, for unravelling the intricacies of phase diagrams by the X-ray method.'

Westgren's greatness as a scientist was not only in his own fundamental contributions to inorganic crystal chemistry, but also in his remarkable ability to gather around himself and inspire a large group of extraordinarily able co-workers and students. Through these scientists and their followers, Westgren became the founder of Swedish crystallography and inorganic solid state chemistry.

Magnéli described the development of ideas originating from research by Westgren and some of his co-workers and discussed their relevance for solid state chemistry.

Protein structure

'Stability of protein structure and the mechanism of hydrophobic interactions' was the title of a lecture presented by Peter L. Privalov (Institute of Protein Research, Academy of Sciences of USSR, Pushchino) in the section on structure and dynamics of macromolecules.

Privalov pointed out that the compact native structure of a protein domain is stabilized by co-operation of various secondary interactions, of which the most interesting are the so-called hydrophobic interactions. These are assumed to be the forces responsible for the low solubility of non-polar substances in water and the consequent tendency for these substances to associate into clusters.

The hydrophobic force is thought to result from the thermodynamically unfavourable entropy decrease upon ordering of water solvated by a non-polar solute. However, analysis of thermodynamic data on transfer of non-polar groups into water when various low molecular weight solutes are dissolved and the unfolding of a compact protein structure, shows that the contribution of water solvation to the Gibbs free energy of transfer of these groups into water is negative and increases in magnitude with decreasing temperature. That is, the water solvation effect only decreases the hydrophobic force which is provided by the enthalpic van der Waals interaction between non-polar groups. Correspondingly, proteins denature upon cooling with the release of heat and the entropy decrease.

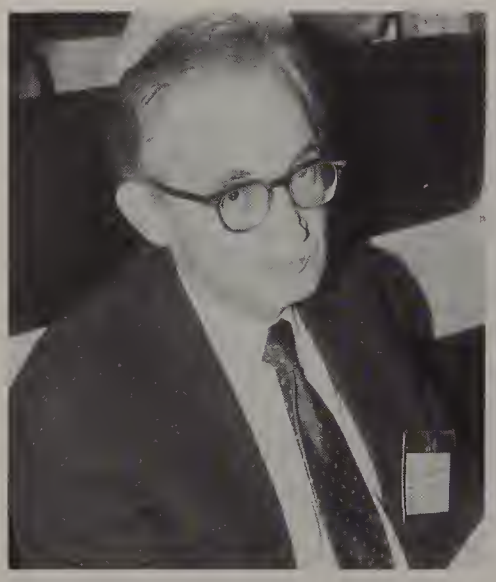
Poster viewing at the congress. Above: Dr Alberto Nuñez Sellés (Havana), who is National Affiliate Membership Secretary for IUPAC in Cuba, was one of the contributors. His poster concerned the direct analysis of mixtures of carbohydrates and amino acids by mass spectrometry.

Privalov added that the two components of hydrophobic interactions, which are the van der Waals interaction between the non-polar groups and the water solvation effect by these groups, have not only the opposite sign, but a different range. Due to this, the hydrophobic interaction is biphasic: it is attractive at a short distance and repulsive when the length exceeds the diameter of the water molecule. This explains the all-or-none character of protein denaturation and the two stages in this transition, which, according to the kinetic studies, proceed with opposite enthalpies.

IUPAC STOCKHOLM 1989

Electrogenerated chemiluminescence

One of the lectures in Section VI – Electron Transfer Reactions was by Allen Bard (University of Texas at Austin, USA) who was elected IUPAC vice-president at the Lund General Assembly following the congress. Bard's lecture was entitled 'Electron transfer reactionsin photoelectrochemistry and electrogenerated chemiluminescence'.



IUPAC vice-president Allen Bard.

Bard discussed electron transfer (et) reactions that occur at or near the electrode solution interface and produce, or are promoted by, light. Such reactions are of interest, he said, not only because of their possible applications (for example: analysis, displays, and solar energy conversion), but also because they can also provide fundamental insights into et reaction energetics and pathways. Thus, studies of electrogenerated chemiluminescence (ECL), along with related inverse photoemission spectroscopic experiments with species (such as oxalate and peroxydisulfate) that form highly reactive and energetic intermediates, provide information about the redox potentials of the intermediates and demonstrate that electron transfers occur isoenergetically.

In photoelectrochemical systems, the absorption of light in a semiconductor leads to formation of electron-hole (e^-h^+) pairs follwed by et reactions. In very small semiconductor particles the energies of the photogenerated e^- and h^+ are functions of both the size and the extent of charging the particles. Bard discussed the preparation of such small particles in polymer matrices or organized monolayer films and their characterization and properties.

Bile alcohols and primitive bile acids

Section VII of the congress was concerned with the chemistry and biochemistry of bile acids. One of the lectures in this section was given by Takahiko Hoshita (Institute of Pharmaceutical Science, Hiroshima University, Japan). His lecture was entitled 'Chemistry and metabolism of bile alcohols and primitive bile acids'.

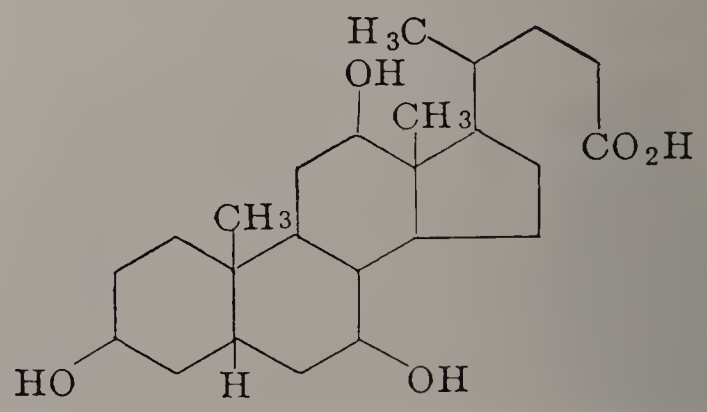
Hoshita indicated that biles of some evolutionary primitive vertebrates such as fishes, amphibians, and reptiles contain sulfuric acid esters of bile alcohols and taurine conjugated or unconjugated higher bile acids. In comparison, mammals contain the taurine and glycine conjugates of more common bile acids and cholanoic acid derivatives.

Bile acids

Bile is secreted by the liver. It is a viscous yellow, brown or green fluid. The sodium salts of the acids found in bile help digestion by absorbing fats from the intestine.

Common bile acids are steroids with a hydroxyl group and five carbon atom side chain terminating in a carboxyl group. The acids do not occur free in bile – they are linked to the amino acids glycine and taurine to form conjugated acids which are water soluble.

The most abundant bile acid in human bile is cholic acid:



Since 1898, when Hammarsten first demonstrated the natural occurrence of bile acids, numerous studies have been carried out to identify bile alcohols and higher bile acids in the bile of primitive vertebrates. These have the common bile acid type of nuclear structure and all or part of the side chain of cholesterol. The natural distribution and chemical structures of bile alcohols and higher bile acids indicate that these compounds are evolutionary precursors of the commoner bile acids found in mammalian species, and the mechanism of conversion of cholesterol to the commoner bile acids in mammals is a recapitulation of the evolution of bile acid molecules.

The accumulation of bile alcohols in diseased humans was first reported in 1974. Since then, a number of investigations have revealed the occurrence of bile alcohols and higher bile acids in mammals.

It is now recognized that trace amounts of these compounds can be detected even in biological fluids from healthy humans. In addition, unusual bile acids with 24 carbon atoms and a double bond at position 4 or 5 have been found in humans. These cholenoic acid derivatives are chemically closer to cholesterol than the commoner saturated bile acids.

The chemical structure of the bile alcohols and the primitive bile acids found in humans indicates that these compounds appear to represent intermediates or simple modifications of intermediates in the biosynthetic sequence between cholesterol and the commoner bile acids and could become prominent under certain pathological conditions, for example, cerebrotendinous xanthomatosis and Zellweger's syndrome.

Press conferences

A number of press conferences took place during the Stockholm congress. The first followed the opening ceremony when congress president Sture Forsén spoke about the congress programme to journalists and drew attention to the important scientific aspects of the congress. IUPAC President Valentin Koptyug then spoke to the press about IUPAC and its activities and particularly its role in environmental matters.

On the following days of the congress press conferences were given by plenary lecturer Martin Fleischmann (UK) on 'Solid-state fusion?', Maria-Regina Kula on 'Downstream processing in biotechnology', Koji Nakanishi on 'What triggers vision', and IUPAC affiliate Fred Brinckman on 'Atmospheric and marine trace chemistry'.

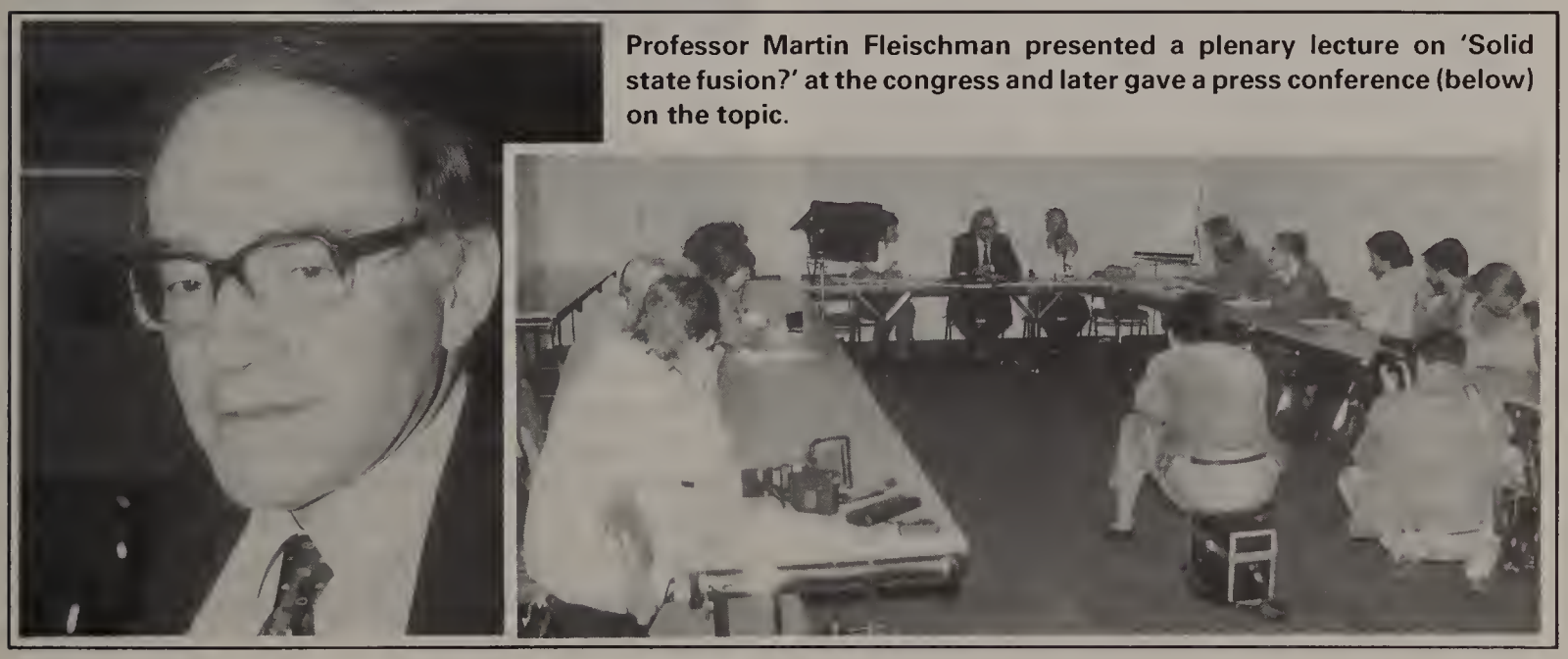
Stuart Builder (USA) also gave a press conference on 'Process synthesis for the recovery of recombinant DNA proteins'. Builder had lectured on the same topic in the section on large-scale separation of biological macromolecules, cells and particles.

Builder suggested to journalists that the size of the biotechnology industry and the availability of important new therapeutic molecules will be directly related to the success of bioprocessing scientists and engineers.

Bioprocessing of proteins begins with the design of an expression or synthesis system which determines the host organism, the cellular location of the product and its initial structure. Early expression systems for small to medium sized proteins, such as insulin or human growth hormone, used bacteria with the derived peptide being localized inside the cell as an insoluble and misfolded species.

Today, larger, more complex molecules, such as the glycoprotein TPA (Tissue-type Plasminogen Activator), may be produced in mammalian cells, which can add carbohydrate residues to the polypeptide chain, fold the protein into its proper 3-dimensional structure and permit formation of disulfide bonds.

Fermentation, which is the next operation, controls the concentration of product in the broth, media-derived impurities and cellular impurities



Professor Martin Fleischman presented a plenary lecture on 'Solid state fusion?' at the congress and later gave a press conference (below) on the topic.

Dr Stuart Builder spoke about the recovery of recombinant DNA proteins.

which can affect the initial stability of the product and its ease or difficulty of recovery. Fermentations of bacteria are usually characterized as being relatively cheap and of high density and productivity.

While bacteria have simple nutrient requirements, which permits a simple defined media, they themselves may add undesirable species (such as degrading enzymes and pyrogens) into the harvest broth. In contrast, mammalian cell cultures are usually more complex and expensive, of lower density, but will usually be free of proteases and pyrogens. The more sophisticated biosynthetic machinery available in mammalian cells may be the dominant factor in choosing between these two hosts.

Usually, when the fermentation is finished, the product of interest exists, but it is not in a usable form. An individual protein in the harvest broth or conditional medium is associated with hundreds of small molecules and thousands of other proteins and nucleic acid species. In addition, the protein may also be unstable in this mixture.

Conferences

Macromolecules
Montreal, Canada
8–13 July 1990

IUPAC SPONSORED

The 33rd International Symposium on Macromolecules (MACRO 90) will be held at the Palais des Congrès, Montreal, Canada. The symposium is intended to be a general meeting where lectures on all topics in pure and applied polymer science are welcome, with a special emphasis on areas of intense current activity.

The three main themes of the symposium are:

- *Materials:* blends; composites; ion-containing polymers; electroactive polymers; high-temperature polymers; liquid crystal polymers; new polymerization reactions; cellulosics: renaissance at last; new polymers;
- *Physics & chemistry:* structure/morphology; advances in orienting and processing polymers with enhanced mechanical properties; photophysics and photochemistry; solution properties/thermodynamics; polymer colloids; environmental degradation; thermal properties; rheology; surface and interfacial phenomena; synthesis and catalysis; inorganic polymers; and
- *Processing & applications:* microstructure control; reactive processing and functional polymers; new polymer applications; applications of biomedical polymers.

The plenary lecturers are E. Baer (USA), P.-G. de Gennes (France), J. E. Guillet (Canada), N. Ogata

Prof. Nikolai Platé, former member of the Macromolecular Division, will be one of the lecturers at MACRO 90.

(Japan), N. Platé (USSR), R. S. Stein (USA), and Ph. Teyssie (Belgium).

In addition, there will be a general session in which Profs W. Heitz and T. Saegusa — respectively, current and former IUPAC Macromolecular Division presidents — will address participants on IUPAC and polymer science. MACRO 90 will also include a technical exhibition.

The registration fees before/after 15 April 1990 are: full registration CAD 400/450; student registration CAD 100/130 and accompanying persons CAD 50/50.

Montreal in July is warm with a typical maximum daytime temperature of 26°C and a night-time low of 16°C.

Organic synthesis
Helsinki, Finland
23–23 July 1990

IUPAC SPONSORED

The 8th International Conference on Organic Synthesis will be held at the Helsinki Fair Centre. It is being organized by the Association of Finnish Chemical Societies and the University of Helsinki.

The meeting will consist of 30 invited lectures and poster sessions. A number of posters will be selected for oral presentation.

The following topics will be covered:

- Modern synthetic methodology;
- Regio- and stereo-control in synthesis;
- Methods in synthesis design: computer applications retrons, synthons, chirons, and related concepts; and
- Catalysis in organic chemistry.

The following speakers have agreed to present plenary lectures: Ronald Breslow (Columbia, USA); Bernard Cazes (Lyon, France); Ian Fleming (Cambridge, UK); Stephen Hanessian (Montreal, Canada); Clayton Heathcock (Berkeley, USA); William Jorgensen (Purdue, USA); Philip Kociensky (Southampton, UK); Jean-Marie Lehn (Strasbourg, France); Wolfgang Oppolzer (Geneva, Switzerland); Gary Posner (John Hopkins, USA).

Carbohydrates
Yokohama, Japan
12–17 August 1990

IUPAC SPONSORED

The 15th International Carbohydrate Symposium will be held in Kenmin Hall and the adjacent Sanbo Center in downtown Yokohama.

The scientific progamme will cover all aspects of the chemistry, biochemistry and utilization of carbohydrates. The following major topic headings will be used to group symposium contributions:

- *Structure:* primary structure, conformational analysis, spectrochemical methods and analysis, applied to carbohydrates and glycoconjugates;
- *Synthesis:* new methods and synthesis of biomolecules such as carbohydrates, antibiotics, nucleosides/nucleotides, glycoconjugates, and the use of carbohydrates as chiral synthons;
- *Biochemistry:* various biological and medical aspects of carbohydrate and glycoconjugates; and
- *Applied and industrial:* various uses of carbohydrates in industry.

The official language of the symposium will be English. Abstracts of all contributions will be distributed to all registrants on arrival. The plenary lectures will be published shortly after the symposium.

Yokohama is easily accessible from Narita International Airport directly via Yokohama City Air Terminal bus or the Yokohama or Shinyokohama Stations of Japan Railways by train or subway.

Yokohama, which was developed as the first westernized city, is now a major overseas trading port of Japan and is located about 30 km south of Tokyo. Accommodation will be arranged in hotels of varying prices around the symposium halls.

The social programme will include visits and tours to become acquainted with the Yokohama area and several aspects of the Japanese society. It will also include a mixer (Sunday), a reception (Monday), and a banquet (Thursday). Additional tours and excursions will be available.

Coordination chemistry
Gera, GDR
13–18 August 1990

IUPAC SPONSORED

The 28th International Conference on Coordination Chemistry will be organized by the Friedrich Schiller University, Jena. The conference will be held in Gera.

The scientific programme will be mainly devoted to seven areas of coordination chemistry.

- Metalloenzymes and their models; metal complexes in diagnosis and therapeutics
- Complexes in solution and metal extraction
- Catalysis by metal complexes and organometallic compounds; activation of small molecules
- Metal complexes and organometallic compounds in organic synthesis
- Metal clusters: theoretical and synthetic aspects
- Solid-state coordination chemistry
- Electronic structure of coordination compounds, theoretical and experimental approaches

XXVIII·ICCC 1990·GERA

The scientific progamme includes seven plenary lectures, 20 session lectures and 13 microsymposia with about 40 lectures. Prominent chemists from all over the world have been invited to present the plenary lectures: M. Chisholm (USA), J.-M. Lehn (France), A. Yamamoto (Japan), V. I. Nefedov (USSR), H. Vahrenkamp (FRG), and I. Block (FRG). All other contributions will be in the form of poster presentations.

The official language of the conference will be English. The organizing committee reserves the right to select some posters as oral contributions. Session lectures and microsymposia will take place in not more than three parallel sessions. Abstracts of the scientific contributions will be published in the conference proceedings which will be distributed during registration.

Conference Centre in Gera, venue of the 28th International Conference on Coordination Chemistry.

Registration fees are DEM 450 for full participants, DEM 250 for students and DEM 200 for accompanying persons. A 10% reduction will be given to IUPAC affiliates. The fees for participants and students cover admission to all scientific events, conference publications, several complementary cultural events and conference transportation. Accommodation is available in local hotels and the students' hall of residence at rates ranging from DEM 25 to DEM 100 per person per night.

The city of Gera, located in the south-western part of the GDR, is a typical old Thuringian town with many cultural and historical traditions and close connections to the Friedrich Schiller University, Jena. A half-day tour will give guests the opportunity to visit the well-known places of activity of the famous German poets J. W. von Goethe and Friedrich Schiller. Several other conference tours and accompanying persons and post-conference tours will be available.

Solubility phenomena
Troy, New York, USA
1–3 August 1990

IUPAC SPONSORED

The 4th International Symposium on Solubility Phenomena (4th ISSP) will be held at the Rensselaer Polytechnic Institute, Troy, New York, USA. There will be seven scientific sessions.

1. Electrolyte solutions
2. Complex equilibria
3. Gas solubilities
4. Non-electrolytes and polymers
5. (Poster session)
6. Calorimetry
7. Complex phase equilibria

The plenary lectures are:

- Mixed solvent systems (Y. Marcus, Israel);
- Complex equilibria (S. Ahrland, Sweden);
- Influence of thermodynamic variables and molecular parameters in the solubility of gases in liquids (R. Fernandez-Prini, Argentina);
- Solubility of hydrogen in metals (F.A. Lewis, UK);
- Thermodynamics and structure of alcohol solutions (D. Patterson, Canada);
- Solubility of gases in polymers (I. Sanchez, USA);
- Solution calorimetry at high temperatures and elevated pressure (J.-P. E. Grolier, France); and
- Sub- and supercritical equilibria in aqueous electrolyte solutions (V. M. Valyashko, USSR).

Registration fees (after 1 April 1990) are USD 225 with a 10% discount for affiliate members. The fees include admittance to the conference, conference documents and final programme, welcoming reception and barbecue. The official language of the conference will be English. No simultaneous translation will be provided.

Troy, NY, on the Hudson River in New York's Capital District is 150 miles north of New York City, 180 miles west of Boston and 240 miles south of Montreal. It is anticipated that most attendees will use university accommodation.

Pesticide chemistry
Hamburg, FRG
5–11 August 1990

IUPAC SPONSORED

The 7th International Congress of Pesticide Chemistry will be held at the Hamburg Congress Centre. It will provide an international forum for a comprehensive scientific discussion of all aspects of pesticide chemistry. Discussion will take place on issues of major public interest and the conclusions will be publicized.

The scientific programme of the congress will include the following main topics.

- Synthesis of new bioactive compounds
- Chemistry and bioactivity of natural products
- Biotechnology in agriculture
- Mode of action and resistance
- Formulation chemistry and technology
- Metabolism and degradation
- Environmental fate
- Residues
- Exposure and risk assessment (including monitoring)
- Regulatory principles, establishment of maximum residue limits, and registration requirements

A symposium for each of these main topics will be organized. In addition, there will be poster/workshop sessions on specific subtopics and an open workshop is planned on topics of public interest. In each of the main topics, special emphasis will be placed on the application of computers and electronic data management.

The congress language will be English. No simultaneous translation will be provided.

Solution chemistry
Ottawa, Canada
5–10 August 1990

IUPAC SPONSORED

The 21st International Conference on Solution Chemistry (XXI ICSC) wil be held at the University of Ottawa, Canada.

The ICSC series of conferences results from the combination of two successful previous series: the International Conferences on Non-Aqueous Solutions (ICNAS) and the International Symposia on Solute–Solute–Solvent Interactions (IS_4I). ICSC thus covers a broad scope of chemistry, including thermodynamic, dynamic and structural aspects of the chemistry of both aqueous and non-aqueous solutions.

The meeting will consist of eight plenary lectures, contributed papers sessions, and two poster sessions arranged to match the themes of the conference. The plenary lectures are:

- Molecular processes at microwave frequences (J. Barthel, FRG);
- Complexation kinetics in solution (B.G. Cox, UK);
- Kinetics and mechanisms of fast reactions in solutions (E.M. Eyring, USA);
- Enzymatic catalysis in anhydrous organic solvents (A.M. Klibanov, USA);
- Supercritical fluid extractions (B.C.Y. Lu, Canada);
- Time-resolved studies of solvation (J.D. Simon, USA);
- Structural investigations of liquid and solutions by X-ray, neutron diffraction and EXAFS techniques (T. Yamaguchi, Japan); and
- Analysis of trace impurities in water (V. Zutič, Yugoslavia).

The conference language will be English. No simultaneous translation will be provided. However, since most of the people at the university and in the City of Ottawa are bilingual, most information will be provided in French and English.

The registration fee will be CAD 200 for scientific participants and CAD 50 for students. These fees include the cost of a Sunday evening get-together party and the conference workbook.

For accomodation, university residence rooms (CAD 28 single/CAD 38 double per night) will be available. The University of Ottawa is located close to several downtown hotels. A block of rooms (CAD 80–95 per night — single or double) has been reserved on behalf of the conference at the Novotel, which is a 10 minute walk from the centre of the University.

Ottawa, Canada's capital, is a beautiful cosmopolitan centre that blends the country's two national cultures. Many of the numerous local attractions can be reached on foot from the university. A partial list of available attractions includes cruises on the Rideau Canal and the Ottawa River and special bus tours around the city and environs, including the Gatineau Park, Byward Market, The Canadian Parliament, National Art Centre, National Gallery of Canada, and Canadian Museum of Civilization.

A tour to Upper Canada Village, near the St Lawrence River, will be organized. Pre- and post-conference tours will be available, including white-water rafting, visits to the 1000 Islands area, Montreal, Toronto and Niagara Falls. A special programme of tours and visits will be arranged for accompanying persons.

The 21st International Conference on Solution Chemistry will be held at the University of Ottawa.

Ottawa International airport is served by several major airlines. An airporter bus service is available from the airport to the major downtown hotels. Train and bus services are available from most points via Montreal and Toronto.

Raman spectroscopy
South Carolina, USA
13–17 August 1990

IUPAC SPONSORED

This International Conference on Raman Spectroscopy is the 12th in a biennial series. Previous meetings have taken place in London (1988), Oregon (1986), Tokyo (1984), Bordeaux (1982), Ottawa (1980), Bangalore (1978), Freiburg (1976), Brunswich, Maine (1974), Reims (1972), Oxford (1970), and Ottawa (1968).

The 12th conference will be held on the campus of the University of South Carolina. Columbia is centrally located in the southern state of South Carolina, approximately 2 hours away from the Atlantic Ocean to the east and an equal distance from the Appalachian Mountain system to the north-west. The city is easily accessible by air, rail and interstate highways.

Accommodation will be available in dormitories at the university and at nearby hotels. The dormitories offer comfortable accommodation with twin-bedded rooms and adjoining baths. The

approximate price for the dormitory is USD 25 for a single room and USD 18 for half a double room. There are also a number of hotels within walking distance which range in price from about USD 50 to USD 70.

The scientific programme will consist of 17 plenary lectures and a number of invited talks of shorter duration which address major topics of interest in Raman spectroscopy. Up to four poster sessions on a range of topics will be scheduled to accommodate the large number of contributed research presentations. The topics for poster sessions will be divided as follows.

- Raman theory
- Vibrational spectra of gases
- Vibrational analysis and molecular structure
- Non-linear Raman spectroscopy
- SERS, surfaces and interfacial phenomena
- Inorganic materials and matrices, superconductors
- The solid state, phase transitions, and effects of temperature/pressure
- Resonance Raman spectroscopy
- Time-resolved Raman scattering and transient species
- Biological systems (lipids, proteins, and biomembranes)
- Macromolecules and polymers
- Band shapes and dynamics
- Band intensities
- Industrial/medical applications
- FT-Raman/new techniques

The registration fees are expected to be about USD 250 for active participants, USD 125 for students and USD 100 for accompanying persons.

A social programme for conference participants is tentatively planned as follows: reception on the university campus, southern-style barbeque at the Riverbanks Zoological Park, reception at the South Carolina State Museum, excursion to the Biltmore Estate in the Blue Ridge Mountains, conference dinner, and conference get-together.

Chemical thermodynamics
Como, Italy
27–31 August 1990

IUPAC SPONSORED

The theme of the 11th International Conference on Chemical Thermodynamics is 'Advances in chemical thermodynamics: theory, experiments, data processing'.

The plenary lectures (including the Rossini lecture) and the opening and closing sessions will be held in the Teatro Sociale, an opera theatre in Como itself. Parallel sessions will be held at Villa Olmo. This is on the west shore of Lake Como, 1 mile from the centre of the town.

The programme will be divided into plenary lectures (including the Rossini lecture), invited papers and contributed papers concerning original contributions on the following topics.

- Biothermodynamics
- Solutions
- Mixtures, VLE and statistical mechanics
- Equations of state, critical and supercritical fluids
- Materials for the pharmaceutical, agricultural and food sciences
- Thermochemistry of inorganic and organic compounds
- Heat capacities and phase transitions
- Polymers
- Surfaces, interfaces and micellar systems
- Environmental thermodynamics
- Materials science thermodynamics (including new materials, metals and alloys)
- Calorimetry, other experimental techniques in chemical thermodynamics, and data processing

The conference language will be English. Abstracts of all presentations will appear in the conference workbook. The main lectures will be published in *PAC*.

The opening and closing sessions and plenary lectures of the 11th IUPAC Conference on Chemical Thermodynamics will be held in the Como opera theatre, Teatro Sociale.

Como lies some 40 miles from Milan. Founded by the Romans, it played an important role in the events of the Italian Middle Ages and is thus endowed with interesting historical remains. The town was the birthplace of Pliny, the Roman writer on biology and natural sciences, as well as of Alessandro Volta, to whom physicists, chemists and especially electrochemists are still indebted.

Today, Como is a leading silk manufacturing centre. Visitors will find many shops selling silk goods and visits to silk factories can be arranged. Como is relatively free from tourists at the end of August and conference participants may find that they virtually have the town to themselves. The Teatro Sociale and Villa Olmo are both 18–19th century buildings in the neo-classical style. Their interiors have recently been restored.

Various excursions and social events will be arranged. The programme for accompanying persons will include visits to Como and Milan, trips to several attractive places along the shores of Lake Como and a trip to Lake Lugano in Switzerland.

Organic chemistry of sulfur
Lódź, Poland
2–7 September 1990

IUPAC SPONSORED

The 11th International Symposium on the Organic Chemistry of Sulfur (14th ISOCS) will be held at the Institute of Physics, University of Lódź, Poland.

The symposium aims to provide an opportunity for the presentation of results in all branches of the organic chemistry of sulfur. Attention will be paid to the application of organic sulfur compounds in modern organic synthesis, to the biological aspects of sulfur chemistry and to achievements in industrial organic sulfur chemistry.

The symposium will consist of ten plenary and ten invited lectures and about 70 other oral communications presented in three parallel sessions. Poster sessions will be arranged to match the themes of the symposium.

The plenary lectures are:

- The organosulfur chemistry of onions (E. Block, USA);
- Organosulfur compunds as chemical chameleons (B.M. Trost, USA);
- Trithiapentalenes and related compounds – has their final structure been found? (C.Th. Pedersen, Denmark);
- Synthesis and reactions of novel sulfur containing heterocyclic systems (W. Ando, Japan);
- The stereochemical course of sulfuryl transfer reactions (G. Lowe, UK);
- New aspects of dithio and thiono esters (K. Hartke, FRG);
- A new chemistry of organophosphorus – sulfur pseudohalogens (J. Michalski, Poland);
- The pericyclic reactions of the derivatives of the dithiocarboxylic acids (V.N. Drozd, USSR);
- New approaches for asymmetric synthesis of sulfoxides (H. Kagan, France); and
- Recent industrial organosulfur chemistry (E. Weill, USA).

The official language of the symposium is English. The registration fees are: USD 250 for delegates, USD 125 for accompanying persons and USD 150 for student delegates. Accommodation in hotels as well as in students dormitories is available. Lunch is included in the symposium fee.

The social programme of the symposium will include an informal mixer, excursions, a bonfire (if the weather is fine) and a banquet. Other social events for active participants and accompanying guests will also be arranged.

The weather in Lódź in September is usually mild, with temperatures ranging from 20°C (day) to 10°C (night). Rain is possible, so in addition to light clothing, a raincoat is recommended.

Lódź is the second largest town in Poland. It is situated in the centre of Poland, 130 km south-west of Warsaw. Access for international air travellers is available through Warsaw 'Okęcie' airport with frequent railway connections to Lódź. There are also direct international railway connections to Lódź from Frankfurt/Main, Leipzig, Moscow, Paris and Prague.

Medicinal chemistry
Jerusalem, Israel
2–7 September 1990

IUPAC SPONSORED

The 11th International Symposium on Medicinal Chemistry will take place in the Ramada Renaissance Hotel, Jerusalem, Israel. The symposium will deal with recent advances in various areas of medicinal chemistry and consist of lectures on the topics listed below and also on recent, novel results in all areas of medicinal chemistry.

The 11th International Symposium on Medicinal Chemistry will centre on topics at the cutting edge of medicinal chemistry research.

The invited plenary and main lectures will centre on topics at the cutting edge of medicinal chemistry research, principally, but not exclusively, in the following areas (plenary lectures are shown in brackets).

1. Drugs associated with bone metabolism (Dr M.R. Uskokovic, USA)
2. Excitatory amino acids receptors in the CNS (with emphasis on NMDA): agonists and antagonists (Prof. J.C. Watkins, UK)
3. Drugs associated with second messenger systems (Prof. S.H. Snyder, USA)
4. Drugs for histamine receptors (Prof. C.R. Ganellin, UK)

5. Novel approaches to antiviral drugs (Prof. J. Michalski, Poland)
6. New methods for drug delivery (Prof. N. Bodor, USA)
7. The use of crystallography in drug design (Prof. T.L. Blundell, UK)
8. Novel approaches to antibacterial drugs (Prof. B.G. Christensen, USA)
9. Novel approaches to anti-cancer drugs (Prof. F.M. Arcamone, Italy)

In addition, there will be sessions on:

- Drugs associated with serotonin receptors;
- Drugs associated with platelet activating factor;
- Chemical approaches to the treatment of atherosclerosis and stroke;
- Pro-drugs;
- Computer-assisted drug design; and
- Naturally occurring toxins.

The official language of the symposium is English. The registration fees (before/after 2nd June 1990) are: for participants USD 250/290; accompanying persons USD 100/120; and for students USD 150/175. The fees include participation in scientific sessions and social events and the printed material of the symposium.

The social programme for the symposium includes a get-together reception, special visit to the Israel Museum, reception by the mayor of Jerusalem, special half-day tour of the Old City of Jerusalem, Israeli folklore event and (optional) farewell dinner.

The weather in Jerusalem in September is warm and pleasant during the day and cooler in the evening with temperatures ranging from 17 to 28°C. There will be no rain!

Polymerization reactions
Paris, France
9–13 September 1990

IUPAC SPONSORED

The International Symposium on Mechanisms and Kinetics of Polymerization Reactions: Their Use in Polymer Synthesis will be held at Rhône Poulenc, 25, Quai Paul Doumer, Courbevoie.

The symposium will present the state of art in the study of anionic, cationic, coordination, radical and step growth polymerizations. It will also compare these various polymerization methods in their use to prepare new macromolecular structures.

Conference activities will include plenary lectures, short communications and posters. There will be no parallel sessions.

Lectures on the following topics will be presented.

- Cationic polymerization: Profs Franta (France), Kennedy (USA) and Sawamoto (Japan)
- Radical polymerization: Prof. Farina (Italy)

Paris: venue of the International Symposium on Mechanisms and Kinetics of Polymerization Reactions — Their Use in Polymer Synthesis.

- Polycondensation: Prof. Heitz (FRG)
- Anionic vinyl polymerization: Prof. Hocker (FRG)
- Anionic polymerization: Profs Hogen-Esch (USA) and Van Beylen (Belgium)
- Coordination polymerization: Profs Kaminsky (FRG) and Spitz (France)
- Macromolecular design: Prof MacGrath (USA)
- Ring opening polymerization: Prof Saegusa (Japan)

The conference languages will be English and French. The registration fees are FRF 1800 for

scientific participants and FRF 900 for students and accompanying persons. The weather in September will probably be sunny and the temperature moderate.

Chemistry Olympiad

The 22nd International Chemistry Olympiad will be held in Paris, France, from 8 to 17 July 1990. The event comprises tests in theoretical and practical chemistry as well as sightseeing, cultural and social events. It provides a unique opportunity for the best young chemists in a country to meet their counterparts from other countries in a spirit of friendly competition. A total of 2 days is spent in competition.

Mass spectrometry in life sciences

The 8th International Symposium on Mass Spectrometry in Life Sciences will be held at the State University of Ghent, Belgium, from 19 to 23 August 1990.

Contributed papers and posters will cover the following topics: fundamental aspects and applications of mass spectrometry in biological, environmental and health sciences; new developments in instrumentation and techniques of analysis; qualitative and quantitative applications in drug analysis, pharmacokinetics, clinical chemistry, biochemistry, toxicology, environmental and ecological research. All papers will be presented in English.

Further information may be obtained from: Prof. A. De Leenheer, Laboratoria voor Medische Biochemie en voor Klinische Analyse, Harelbekestraat 72, B-9000 Ghent, Belgium. Tel: +32 (91) 21 89 51. Ext. 324. Fax: +32 (91) 21 79 02.

Microcolumn separation methods

The 2nd International Symposium on Microcolumn Separation Methods will be held at the Aronsberg Conference Hotel, 40 km north of Stockholm, Sweden, from 20 to 22 August 1990.

The symposium will highlight developments in capillary electrophoresis, microcolumn liquid chromatography, supercritical fluid chromatography and capillary gas chromatography. New detection strategies, column technology, coupled column systems, sample introduction systems, novel solid phases and new demanding applications will have priority in the programme.

Further information from: Eva Mattsson, Analytical Division, Swedish Chemical Society, Wallingatan 26 B, S-111 24 Stockholm, Sweden. Tel: +46 (8) 115260/115280.

Genetics of industrial micro-organisms

The 6th International Symposium on Genetics of Industrial Micro-organisms will be held at the Palais des Congrès, 12–18 August 1990.

The scientific programme will include the following sessions: protein engineering; genetic instabilities; heterologous expression; secretion; extrachromosomal elements — transposons; metabolic pathways — manipulations; corynebacteria — production of amino-acids; streptomycetes — antibiotics — resistance mechanisms; lactic acid bacteria; industrial yeasts; filamentous fungi; methylotrophs — methanogens; genetics of bacillus; clostridia; plant–bacteria interactions; alcoholic and malolactic fermentations — aroma; biomass degradation; toxins of micro-organisms; bioconversions; genetics of industrial micro-organisms in Eastern Europe.

For general information contact: GIM 90, c/o SOCFI, 14, rue Mandar, 75002 Paris, France. For the scientific programme contact: GIM 90, c/o Société Française de Microbiologie, 28, rue du Docteur Roux, 75724 Paris Cedex 15, France.

Euroanalysis VII

Euroanalysis VII — the 7th European Conference on Analytical Chemistry — will be held in Vienna, Austria, 26-31 August 1990. This will be the 132nd Event of the Federation of European Chemical Societies.

The scientific programme consists of three sections: (A) Applications of analytical chemistry, (B) Methods of analytical chemistry and (C) Special sessions: 1. Sample preparation for inorganic and organic trace analysis; 2. Computer-based analytical chemistry — COBAC V; 3. Quality assurance in analytical chemistry; 4. Education and training in analytical chemistry.

Further information from: Eva M. Schaup, Interconvention, Austria Centre Vienna, A-1450 Vienna, Austria.

Fourier transform infrared spectroscopy

The International Workshop on Fourier Transform Infrared Spectroscopy will be held in Antwerp, Belgium from 19 to 21 September 1990. The workshop aims to present a comprehensive treatment of both practical applications and fundamental aspects of FTIR technique.

For further information contact: Mrs M. Stalmans (secretary), University of Antwerp (UIA), Department of Chemistry, Universiteitsplein 1, B-2610 Antwerp-Wilrijk, Belgium.

Conference Calendar

Conference circulars and registration forms for the IUPAC-sponsored conferences listed below may be obtained, upon request, from the names and addresses shown in brackets.

1990

Porous solids

6–9 May. 2nd International Symposium on Charterization of Porous Solids (COPS-2). Alicante, Spain. (Prof. F. Rodríguez-Reinoso, Departmento de Química Inorgánica e Ingeniería Química, Facultad de Ciencias, Universidad de Alicante, Apartado 99, Alicante, Spain.)

Carotenoids

20–25 May. 9th International Symposium on Carotenoids. Kyoto, Japan.
(Dr M. Ito, Kobe Women's College of Pharmacy, 4-19-1, Motoyamakita-machi, Kobe 658, Japan.)

Polymer networks

20–25 May. 10th International Symposium on Polymer Networks. Jerusalem, Israel.
(Networks 90, Melia-Te'um, POB 8388, Jerusalem 91082, Israel.)

Catalysis

5–8 June. International Symposium on Unsteady State Processes in Catalysis (USPC). Novosibirsk, USSR.
(Dr S. M. Bogdashev, Institute of Catalysis, Prosp. Akad. Lavrentieva 5, Novosibirsk 630090, USSR. Tel: +7 (3832) 350178 Fax: +7 (3832) 355756.)

Trace elements in health and disease

5–8 June. International Symposium on Trace Elements in Health and Disease. Helsinki, Finland.
(Trace Elements/NTES-COMTOX Meeting, Institute of Occupational Health, Office of Information and International Affairs, Ms. Virpi Castrèn, Topeliuksenkatu 41 a A, 00250 Helsinki, Finland. Tel: +358 (0) 474345 Fax: +358 (0) 4747548. Telex: 121394 tltx sf occup-health.)

Ceramics

24–30 June. 7th World Ceramic Congress. Montecatini Terme, Italy.
(7th CIMTEC — World Ceramics Congress, PO Box 174, 48018 Faenza, Italy. Tel: +39 (546) 664143. Fax: +39 (546) 664138.)

Macromolecules

8–13 July. 33rd International Symposium on Macromolecules. Montreal, Canada.
(IUPAC MACRO 90 Secretariat, Dept. of Chem. Engineering, McGill University, 3480 University Street, Montréal, Québec, Canada H3A 2A7. Tel: +1 (514) 3987487. Fax: +1 (514) 398678.)

Mechanisms of polymer strength and toughness

16–19 July. 13th Discussion Conference on Macromolecules Mechanisms of Polymer Strength and Toughness. Prague, Czechoslovakia.
(PMM Secretariat, c/o Institute of Macromolecular Chemistry,

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy.

IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than 3 months in advance. If a visa is not granted 1 month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

In the case of the 32nd IUPAC Congress (Stockholm, Sweden: 2–7 August 1989), it was observed that the time for treating visa applications in Sweden may be as long as 5–6 weeks. To this must be added the time for handling the applications at the Swedish Embassy in the various countries of the intending participants. This confirms the need for applications to be made not less than 3 months in advance.

How to apply for IUPAC sponsorship

To apply for IUPAC sponsorship, conference organizers should write to the IUPAC Secretariat (see inside back cover for address) requesting an Advanced Information Questionnaire (AIQ). Completed AIQs should be returned to the Secretariat preferably **2 YEARS** and at least 12 months before the conference. Late applications will not be considered. Further information on granting of IUPAC sponsorship was published in *CI*, Vol. 11, No. 1, pp. 4–5, 1989.

Czechoslovak Academy of Sciences, 162 06 Prague, Czechoslovakia. Tel: +42 (2) 360345 Fax: +42 (2) 367981. Cable MACRO PRAGUE. Telex: 122019 IMCP C.)

Photochemistry

22–28 July. 13th IUPAC International Symposium on Photochemistry. Warwick, UK.
(Dr J. F. Gibson, 13th IUPAC Symposium on Photochemistry, Royal Society of Chemistry, Burlington House, London W1V 0BN; UK. Tel: +44(1) 7349864. Fax: +44(1) 4378883.)

Polymer analysis and characterization

23–25 July. 3rd International Symposium on Polymer Analysis and Characterization. Brno, Czechoslovakia.
(Dr Howard G. Barth, Du Pont Company, Experimental Station, Wilmington, Delaware 19898, USA. Tel: +1 (302) 6954354.)

Organic synthesis

23–27 July. 8th International Conference on Organic Synthesis. Helsinki, Finland.
(8th IUPAC Conference on Organic Sythesis, PO Box 22, SF-00101 Helsinki, Finland. Fax: +358 (0) 611188.)

Boron chemistry

30 July–3 August. 7th International Meeting on Boron Chemistry — IMEBORON VII. Torun, Poland.
(Dr J. K. Ruminski, IMEBORON VII Secretary, Institute of Chemistry, Nicolaus Copernicus University, 7 Gagarin Street, 87-100 Torun, Poland.)

Solubility phenomena

1–3 August. 4th International Symposium on Solubility Phenomena. Troy, New York, USA.
(Dr Mark Salomon, Co-Chairman, 4th International Symposium on Solubility Phenomena, PO Box 254, Fair Haven, NJ 07704, USA.)

Solution chemistry

5–10 August. 11th International Conference on Solution Chemistry. Ottawa, Canada.
(The Secretariat, XXI ICSC, Faculty of Science, University of Ottawa, Ottawa, Ontario, Canada K1N 6N5. Tel: +1 (613) 5642430. Fax: + (613) 5645014.)

Pesticide chemistry

5–11 August. 7th International Congress of Pesticide Chemistry. Hamburg, FRG.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, FRG. Tel: +49 (69) 7917360 or +49 (69) 7917365. Fax: +49 (69) 7917322 and 7917475.)

Physical organic chemistry

6–10 August. 10th International Conference on Physical Organic Chemistry. Haifa, Israel.
(Prof. Yitzhak Apeloig, Department of Chemistry, Technion-Israel Institute of Technology, Haifa, 32000, Israel. Tel: +972 (4) 293111. Telex: 46406.)

Carbohydrates

12–17 August. 15th International Carbohydrates Symposium. Yokohama, Japan.
(Prof. Yoshiharu Ishido, General Secretary, 15th International Carbohydrate Symposium, c/o Department of Chemistry, Faculty of Science, Tokyo Institute of Technology, O-Okayama, Meguro-ku, Tokyo 152, Japan.)

Raman spectroscopy

13–17 August. 12th International Conference on Raman Spectroscopy. Columbia, South Carolina, USA.
(Prof. J. R. Durig, College of Science and Mathematics, University of South Carolina, Columbia, South Carolina 29208–0001, USA. Tel: +1 (803) 7772505. Fax: +1 (803) 7773065. Telex: 573414 UNIVERSCAROL.)

Coordination chemistry

13–18 August. 28th International Conference on Coordination Chemistry. Gera, GDR.
(Dr D. Walther, Sektion Chemie der Friedrich-Schiller-Universität. Steiger 3, Haus 111, Jena 6900, GDR.)

Organometallic chemistry

19–24 August. 14th International Conference on Organometallic Chemistry. Detroit, Michigan, USA.
(Prof. John P. Oliver, The Secretariat, 14th International Conference on Organometallic Chemistry, 135 Chemistry Building, Wayne State University, Detroit, MI 48202, USA.)

Chemical thermodynamics

27–31 August. 11th IUPAC Conference on Chemical Thermodynamics. Como, Italy.
(11th IUPAC Conference on Chemical Thermodynamics, c/o Dip. to Chimica Fisica Applicata, Politecnico di Milano, Via Golgi, 39, 20133 Milano MI, Italy. Tel: +39 (2) 2363770/2664317/2364522. Fax: +39 (2) 2664950.)

Medicinal chemistry

2–7 September. 11th International Conference on Medicinal Chemistry. Jerusalem, Israel.
(Prof. Raphael Mechoulam, Deparrtment of Natural Products, School of Pharmacy, Hebrew University, Jerusalem, 91904, Israel.)

Organic chemistry of sulfur

2–7 September. 14th International Symposium on the Organic Chemistry of Sulfur. Lodz, Poland.
(Prof. M. Mikolajczyk, Centre of Molecular and Macromolecular

Studies, Polish Academy of Sciences, Sienkiewicza 112, 90-363 Lodz, Poland.)

Polymerization reactions

9–13 September. International Symposium on Mechanisms and Kinetics of Polymerization Reactions: Their Use in Polymer Synthesis. Paris, France.
(SYMBOL 90 — Secretariat, Laboratoire de Chimie Macromoléculaire, Université Pierre et Marie Curie — Tour 54 — 4e étage, 4 Place Jussieu, 75252 Paris Cédex 05, France. Tel: + 33 (1) 43362525 ext. 5541. Fax: +33 (1) 43544097. Telex: UPMC SIX 200 145 F.)

Safety in chemical production

10–13 September. 1st IUPAC Workshop on Safety in Chemical Production. Basel, Switzerland.
(This workshop is not open for general participation but restricted to a limited number of invited participants.)

Solid sampling with optical atomic spectroscopy

8–10 October. 4th International Colloquium on Solid Sampling with Optical Atomic Spectroscopy. Julich, FRG.
(Dr R. F. M. Herber, Coronel Laboratorium, Academisch Medisch Centrum, Gebouw K, Meibergdreef 15, 115 AZ Amsterdam, The Netherlands.)

Automation and new technology in the clinical laboratory

9–12 October. 4th International Congress on Automation and New Technology in the Clinical Laboratory, Barcelona, Spain.
(Dr Roman Galimany, Sección Automatización. Servicio de Bioquímica, Residencia Sanitaria Germans Trias i Pujol, Carretera Canyet s/n. 08916 Barcelona, Spain.)

Mycotoxins and phycotoxins

4–15 November. International Symposium and Workshop on Mycotoxins and Phycotoxins. Cairo, Egypt.
(Professor Khayria Naguib, National Research Centre, Dokki, Cairo, Arab Republic of Egypt.)

19th Latin American chemistry congress

5-9 November. 19th Latin American Chemistry Congress. Buenos Aires, Argentina.
(Prof. Eduardo G. Gros, Departmento de Química Orgánica, Facultad de Ciencias Exactas y Naturales, Universidäd de Buenos Aires, Pab. 2, Ciudad Universitaria, 1428 Buenos Aires, Argentina.)

Speciality polymers

7–9 November. International Symposium on Speciality Polymers. Singapore.
(Secretary, IUPAC Symposium Organization Committee, c/o Department of Chemistry, National University of Singapore, Singapore 0511, Republic of Singapore.)

1991

Polymer materials

10–15 February. Polymer 91: International Symposium on Polymer Materials: Preparation, Characterization and Properities. Melbourne, Australia.
(Polymer 91 Secretary, PO Box 224, Belmont, Victoria 3216, Australia. Fax: +61 (52) 472657.)

Organic chemistry: technological perspectives

15–19 April. 2nd International Symposium 'Organic Chemistry: Technological Perspectives'. Baden-Baden, FRG.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, FRG.)

Spectroscopy

9–14 June. 17th Colloquium Spectroscopicum Internationale. Bergen, Norway.
(17th Colloquium Spectrscopicum Internationale, HSD Congress — Conference, PO Box 1721 Nordnes, N. 5024 Bergen, Norway.)

Surface and colloid science

7–12 July. 7th International Conference on Surface and Colloid Science. Compiégne, France.
(Prof. M. Clausse, Université de Technologie de Compiégne, B.P. 649, F-60206 Compiégne Cédex, France.)

Rheology of polymer melts

15–19 July. 14th Discussion Conference on Macromolecules Rheology of Polymer Melts. Prague, Czechoslovakia.
(Dr P. Čefelín, Deputy Director, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovského n. 2, 162 06 Prague 6-Petriny, Czechoslovakia. Tel: +42 (2) 360317. Telex: 122019 IMCP C.)

IUPAC congress

17-22 August. 33rd IUPAC Congress, Budapest, Hungary. (33rd IUPAC Congress, Prof. E. Pungor, c/o Hungarian Academy of Sciences, H-1111 Budapest, Gellert ter 4, Hungary.)

PURE AND APPLIED CHEMISTRY

Official Journal of the International Union of Pure and Applied Chemistry

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P.D. Gujral, *IUPAC Secretariat, Bank Court Chambers, 2-3 Pound Way, Cowley Centre, Oxford OX4 3YF, England*

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- to publish the main invited lectures of symposia sponsored by IUPAC at which authoritative and up-to-date accounts of the subject of the symposium are presented by prominent scientists; the lecturers cover their own recent work and review the worldwide literature on the subject;
- to publish the recommendations of the Union's commissions on nomenclature, symbols and units;
- to publish technical reports on standardization, recommended procedures, collaborative studies, data compilations, etc.;
- to publish critically evaluated state-of-the-art commissioned review articles on important topics.

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NEW TITLES IN THE SOLUBILITY DATA SERIES

Hydrogen Halides in Non-Aqueous Solvents

Edited by **P G T Fogg & W Gerrard**, *Polytechnic of North London, Holloway, London, UK*

Volume 42 of the *Solubility Data Series* contains evaluated data for the solubility of hydrogen fluoride, hydrogen chloride, hydrogen bromide and hydrogen iodide in non-aqueous solvents. Information on about four hundred systems is included. Hydrogen halides take part, either as reactants or products, in many reactions of organic compounds. Evaluated solubility data for these gases are required for the prediction of the course and mechanism of such reactions. The volume will therefore be of especial interest to organic chemists and to chemical engineers concerned with syntheses involving halogen compounds in non-aqueous media.

Contents: Foreword. Preface. The Solubility of Gases in Liquids: Hydrogen Fluoride in Non-Aqueous Solvents. Hydrogen Chloride in Non-Aqueous Solvents. Alkanes. Mixtures of heptane and other solvents. Miscellaneous hydrocarbons. Aromatic hydrocarbons. Alkanols. Halogenated alkanols. Alkenols and alkynols. Alkanediols. Aromatic and alicyclic alcohols. Ethers and miscellaneous solvents containing carbon, hydrogen and oxygen. Aliphatic carboxylic acids. Esters of carboxylic and carbonic acids. Halogenated alkanes and halogenated alkenes. Halogenated aromatic compounds. Nitrogen compounds. Sulfur compounds. Boron compounds. Phosphorus compounds. Silicon compounds. Tetrachlorostannane and titanium chloride. **Hydrogen Bromide in Non-Aqueous Solvents.** Critical evaluation of data. Alkanes. Aromatic hydrocarbons. Alcohols, ethers and carboxylic acids. Haloalkanes and halobenzenes. Nitrogen compounds. Sulfur compounds and boron compounds. **Hydrogen Iodide in Non-Aqueous Solvents.** Critical evaluation of data. Alcohols, ethers and carboxylic acids. Alkyl halides. Sulfur compounds and boron compounds. **Physical Properties of the Hydrogen Halides. System Index. Registry Number Index. Author Index.**

X= Solubility Data Series, Volume 42
0 08 0239250 (H) US$85.00 496pp Due Dec 1989

Halides, Oxyhalides and Salts of Halogen Complexes of Titanium, Zirconium, Hafnium,Vanadium, Niobium and Tantalum

Edited by **J Hala**, *J E Purkyne University, Brno, Czechoslovakia*

Halides, oxyhalides, and salts of halogen complex ions containing elements of groups four and five (titanium, zirconium, hafnium, vanadium, niobium and tantalum) is Volume 40 of the series. The volume covers all relevant data on the solubility of the title compounds of Ti(III, IV), Zr(IV), Hf(IV), V(II, III, IV, V), Nb(V) and Ta(V) as published in the literature up to mid-1988. The solubilities of these substances in aqueous, nonaqueous, binary and multicomponent systems are compiled. Critical evaluations are presented for a number of the systems. The volume will be of interest to hydrometallurgists, inorganic and analytical chemists, and to all who work with the chemistry and technology of group four and five metals.

Contents: Section headings: Aviezer Stevan Kertes: a personal appreciation, Y Marcus. Publications of A S Kertes. Introduction to the solubility of solids in liquids. Acknowledgement. The solubility of titanium halide and oxyhalide substances. The solubility of zirconium halide and oxyhalide substances. The solubility of hafnium halide and oxyhalide substances. The solubility of vanadium halide and oxyhalide substances. The solubility of niobium halide and oxyhalide substances. The solubility of tantalum halide and oxyhalide substances. System index. Registry number index. Author index.

X= Solubility Data Series, Volume 40
0 08 0362397 (H) US$85.00 364pp Due Nov 1989

Cumulative Index Volumes 20-38

Edited by **C L Young**, *Department of Chemistry, University of Melbourne, Parkville, Victoria, Australia*

This *Cumulative Index* covers Volumes 20 to 38 of the *Solubility Data Series*. The first cumulative index, Volume 19, published in 1985, covered the first eighteen volumes of the series. Both indexes have been produced to enable workers to locate data both for the system of interest and closely related systems without the necessity of consulting the indexes of individual volumes. The index consists of three sections: a System Index, an Author Index and a Chemical Contracts Registry Number Index.

Contents: Section headings: System Index. Registry Number Index. Author Index.

X= Solubility Data Series, Volume 39
0 08 0372058 (H) US$85.00 382pp approx Due Nov 1989

X= Books published in series. Standing/continuation orders invited A list of published volumes in each series is available free on request
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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries;
- to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;
- to co-operate with other international organizations which deal with topics of a chemical nature;
- to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 45 countries, each represented by a national organization, such as an academy of science or research council.

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Chemistry International

IUPAC

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1990, Vol. 12. No. 4 (July)

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Front cover: Florence, Italy, venue of the 5th IUPAC Symposium on Organometallic Chemistry, October 1989.

1990 International Union of Pure and Applied Chemistry

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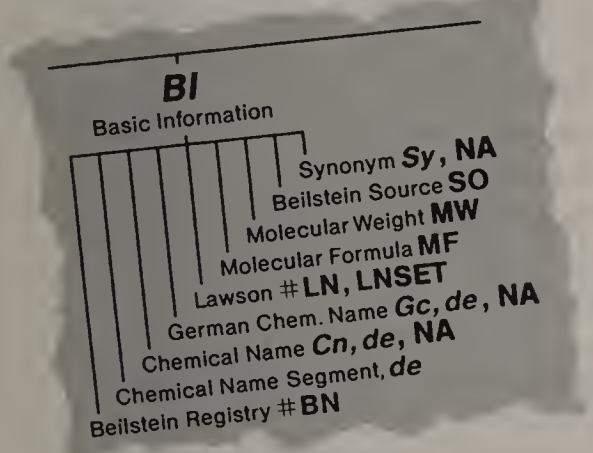

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Hints from the Help Desk

Restrict the search to the Chemical Name and Synonym fields.

Use format 2, the free format, to see basic information about the substance and the kinds of data present in the record.

```
?s 2-cyclopentylmethyl-pyridine/cn,sy
      S1        1  2-CYCLOPENTYLMETHYL-PYRIDINE/CN,SY
?t 1/2/1
  1/2/1
114533      CAS Reg. No: 57756-05-5
2-cyclopentylmethyl-pyridine
  German Chem. Name: 2-Cyclopentylmethyl-pyridin
  Molecular Formula: C11H15N
  Molecular Weight: 161.25
  No. Ref: 7
  Data Present:
   Data  Ref
   +Ref/Only UDF    Data Type
      3/1    PR Preparative Data
      3/1       .Preparation
      9/     PP Physical Properties
      9/        .Physical Properties of Pure Compound
      5/     PS ..Physical State
      5/     PL ...Liquids
      5/     BP ....Boiling Point
      2/     PM ..Other Physical & Mechanical Properties
      2/     DN ...Density
      2/     OP ..Optics
      2/     RI ...Refractive Index
?t pr

 1/PR/1
  Data Present:
   Data  Ref
   +Ref/Only UDF    Data Type
      3/1    PR Preparative Data
Preparative Data
   Preparation
      Starting Material: BN=104581, 2-methyl-pyridine,
      chlorocyclopentane
      Reagent: sodium amide
      Temp: 120 C (Ref. 1,  handbook),  (Ref. 2,  handbook)
   Preparation
      Starting Material: BN=104581, 2-methyl-pyridine,
      bromocyclopentane
      Reagent: phenyl lithium, diethyl ether (Ref. 3,  handbook)
   Preparation
      Starting Material: BN=104581, 2-methyl-pyridine,
      chlorocyclopentane
      Reagent: sodium amide, liquid ammonia
      By-product: 2-dicyclopentylmethyl-pyridine (Ref. 4,
      handbook)
   Preparation  (Ref. 5)
   Refs.
      1, Schering A G, DRP/DRBP Org. Chem: 6 2509
      2, Tchitchibabine, BSCFAS, Bull.Soc.Chim.Fr., (5) 5 (1938)
         429, 435
      3, Prelog, et al, HCACAV, Helv.Chim.Acta, 29 (1946) 484, 494
      4, Lochte, Wheeler, JACSAT, J.Amer.Chem.Soc., 76 (1954)
         5548, 5549
      5, International Flavors and Fragrances Inc, US 3914227,
         (1975), CA 8431129
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News & Views

National subscriptions to IUPAC

The IUPAC national subscription scheme is based on Council decisions at General Assemblies in Leuven (1981) and Lyngby (1983). The scheme (see *CI*, Vol. 8, No. 6, p. 28, 1986) was presented to Council in Lyon (1985) and updated later. At the General Assembly in Lund (1989), Council accepted the following latest version of the scheme ('4L Subscription Scheme').

IUPAC pays for a number of expenditures (mainly travel, subsistence, Secretariat, and bank charges), which are included in the biennial budgets approved by Council. The necessary income is derived mainly from national subscriptions, profit from IUPAC assets, and surplus on publications.

The national subscription, which is a minimum figure, may be made up of two integral parts.

1. National Adhering Organization (NAO) payment, obtained from governmental sources, etc.
2. Income from Company Associates (CAs), paid directly to IUPAC or through the NAO.

Each CA pays one or several basic units. Other income figures in the budget than subscriptions are estimated, but the figures are in principle fixed. Hence, the budget must be balanced by the sum of NAO payments (item 1 above).

The size of the minimum national subscription (NS_i) for country (i) is related to the latest available national chemical turnover (CT_i) of the country by the following formula (TNS = ΣNS_i being the budget figure of the total minimum national subscriptions income):

$$\frac{NS_i}{TNS} = \left(\frac{CT_i}{\Sigma CT_i} \right)^{0.68}$$

In Lyon, Council decided that, normally, average biennial CT figures are to be used. If a country provides no CA income, minimum NAO payment is of course equal to NS_i, otherwise the CA income is deducted from NS_i to obtain the minimum NAO payment.

Since CT_i is the deciding figure, IUPAC collects data from reliable sources, and the figures include the chemical industries listed by IUPAC. A detailed listing of IUPAC CT-industries was originally approved by Council in Leuven, and a revized listing was approved at Lund. Nevertheless, a NAO may request correction (down or up) of a recommended CT_i by the presentation of valid arguments. For the handling of such requests the Treasurer consults the Finance Committee, which considers the entire matter of NS_i regularly.

After the CT_i figure is settled, a NAO may still ask for a reduced NS_i on special grounds, which may prevail for one or more years. On the other hand, a NAO may elect to pay more than the minimum NS_i, for example, when the CT_i evidently does not represent the industrial chemical activity in a country. An increased minimum NS_i may also be recommended by IUPAC. When a country pays more than the minimum NS_i, it does not decrease the minimum NS_i figures of other NAOs. Final decisions, as necessary, are taken by the officers/ Executive Committee.

In exceptional circumstances a NAO may apply to IUPAC in a particular year for permission to make part payment of its subscription in national currency, provided that this part is used to pay for approved IUPAC budget costs.

When the IUPAC Council met in Lund last year, it accepted the '4L Subscription Scheme'.

Names and Addresses

Full details (names, addresses, telephone/telex/fax numbers) of all commission and committee chairpersons and secretaries and IUPAC officers were published in the November 1989 issue of *CI* (Vol. 11, No. 6, pp. 225–235). The IUPAC Secretariat has been notified of the following change:

Prof. N. Montalbetti (President, Clinical Chemistry Division). Fax: +39 (2) 64442901.

Achieving perfection

At the recent meeting on the IUPAC Programme on 'Chemistry and the Environment' (see page 132) held at the IUPAC Secretariat in Oxford, Clinical Chemistry Division President Prof. Norbetto Montalbetti quoted Cardinal Newman:

NOTHING!
Would be done at all, if a
Man waited till he could do it
So well that
No one
Could find fault with it.

Affiliate membership programme in the Union of Myanmar

At the Lund General Assembly last year, IUPAC invited Mr Than Aye to set up the affiliate membership scheme in the Union of Myanmar – previously known as Burma. He was asked to nominate 25 chemists under 35 years of age from the country to become sponsored IUPAC affiliates. The operation of the programme in Myanmar is being assisted by Dr Arpad Ambrus through the European office of the United Nations Development Programme Project FAO.

Mr Than Aye is Section Head, Pesticide Analysis Laboratory, Myanmar Agricultural Service, Yangon. He attended the Lund meeting of the Commission on Agrochemicals as an observer. His colleague, Dr Ambrus works in Yangon as a Pesticide Analysis Specialist for the Food and Agriculture Organization of the United Nations (FAO). He had previously worked in Kabul, Afghanistan. Ambrus attended the Commission on Agrochemicals meeting in Lund as a titular member.

Mr Than Aye at Lund.

Next ICSU general assembly

The 23rd meeting of the General Assembly of the International Council of Scientific Unions (ICSU) will be held at the National Palace of Culture, Sofia, Bulgaria at the invitation of the Bulgarian Academy of Sciences. The assembly will open on the evening of 1st October 1990 and conclude on the afternoon of 5th October. It will be preceded by the 27th meeting of the General Committee and the Executive Board.

National Palace of Culture, Sofia.

Whistler award winner

The Whistler award was established by the International Carbohydrate Organization to honour Roy L. Whistler, Professor Emeritus, Purdue University, USA and to recognize carbohydrate researchers who have made contributions of excellence with promise of continuing significant contributions. It carries a USD 10 000 cash prize and is made biennially at the International Carbohydrate Symposia.

Johannis Kamerling (The Netherlands): contributions to modern structural carbohydrate chemistry recognized.

Johannis P. Kamerling, Department of Bioorganic Chemistry, Utrecht University, The Netherlands is the fourth recipient of this award which will be presented at the IUPAC-sponsored 15th International Carbohydrate Symposium to be held in Yokohama, Japan, 12–17 August 1990. Previous recipients have been Drs Tomoya Ogawa (Japan, 1984), Klaus Bock (Denmark, 1986) and David Bundle (Canada, 1988).

The award is being made in recognition of Kamerling's major contributions to modern structural carbohydrate chemistry. Kamerling has played an important role in the introduction of physical methods for structural elucidation of polysaccharides and glycoconjugates, methods which have revolutionized the means by which complex carbohydrate structures are determined and which have provided the basis for our emerging understanding of interactions between oligosaccharide structures and protein molecules.

The International Carbohydrate Organization is an Associated Organization of IUPAC. It is composed of national representatives of 21 countries in which there is substantial carbohydrate research.

We regret to record the death of

Prof. H. Erdtman, Sweden (13 December 1989) – President of Organic Chemistry Division (1959–1963), Commission on Chemical Plant Taxonomy (1965–1973).

Dr W. Gerrard, UK (5 February 1990) – Commission on Solubility Data (1979–1983).

Dr F.J. Joubert, Republic of South Africa (23 June 1989) – Macromolecular Division (1968–1975).

Mr H.K. Raaschou Nielsen, Denmark (20 November 1989) – Applied Chemistry Division Committee (1963–1967), Section on Organic Coatings (1955–1973), Working Party on Supported Polymer Films/Macromolecular Division (1973–1987).

Laboratory slang

In their 'Guidelines for drafting IUPAC recommendations' the Union's Interdivisional Committee on Nomenclature and Symbols (IDCNS) advises authors not to use general laboratory slang pertaining to a particular field in written reports (see pages 144–147).

Who's who at the IUPAC Secretariat

IUPAC employs eight full-time and one part-time members of staff at its Secretariat in Oxford. They are (from left): standing – Mr Dass Gujral (Scientific Publications Secretary); Miss Ann Troughton (Deputy Executive Secretary); Dr Mo Williams (Executive Secretary); Mrs Mary Patterson (Secretarial Assistant to Dr Freemantle); Dr Michael Freemantle (Information Officer); seated – Mrs Ulrike Inglis (Secretarial Assistant to Miss Troughton); Mrs Gill Crook (Affiliate Membership Assistant, part-time); Miss Muriel Welch (Secretarial Assistant to Mr Gujral); Mrs Erica Sheppard (Secretarial Assistant to Dr Williams).

Letter to the Editor

SI units and the mole — time for a change?

Sir,

The increasingly widespread use of SI units has greatly improved communications within and between various branches of science. However, it is important that the definitions of SI be continually re-examined in the light of widening experience and improved where possible. In plant sciences, the continuing integration of knowledge from the molecular level to that of the plant and crop makes the use of a single coherent unit system such as SI essential. While SI generally fills this role admirably, our experience suggests that the SI mole could be more satisfactorily defined than at present: the magnitude of molar mass would then be a more convenient quantity, and the likelihood of confusion over its units would be reduced. Our objective here is to clarify this issue.

It is proposed the mole be redefined so that 1 MOLE (using upper-case letters to distinguish the redefined quantity) of ^{12}C has a mass of 12 kg, and the molar mass of ^{12}C is 12 kg $MOLE^{-1}$; this contrasts with the SI mole, which is such that 1 mole of ^{12}C has a mass equal to 0.012 kg, and the molar mass of ^{12}C is 0.012 kg $mole^{-1}$.

John Thornley (left) and Ian Johnson argue that the SI mole could be defined more satisfactorily than at present.

Physicists and chemists have agreed to assign the value 12 to the isotope 12 of carbon. The SI mole[1,2] is the amount of substance which contains as many elementary entities as there are atoms in 0.012 kg of ^{12}C. Our thesis is that there is no rationale attached to the choice of 0.012 in this definition, apart from adherence to traditional quantities (for example, that the SI mole should be identical to the old gram molecule), and there are good reasons for preferring to refer to 12 kg of ^{12}C in a redefined MOLE.

We use symbols (italicized) to denote physical or chemical *quantities*, a quantity is equal to the product of a *number* and a *unit*. We use [ ] to indicate the units being used with a symbol. Thus, m [kg] denotes mass, with, for example, $m = 3.2$ kg. In an equation, there is equality of both the numbers and the units on the two sides of the equation.

A MOLE is defined as that amount of substance which contains N entities of the substance. The units attached to N are $MOLE^{-1}$as in (3) below. Choose a reference substance, denoted by the subscript r, where the mass of one entity is m_r [kg] (e.g. $r \equiv {}^{12}C$). By definition:

$$Nm_r = \mu_r \qquad (1)$$

where μ_r [kg $MOLE^{-1}$] is the mass of 1 MOLE of the reference substance. In (1), either N or μ_r can be assigned an arbitrary numerical value. Following convention, the reference substance is taken to be ^{12}C, but departing from convention, μ_r is defined as 12 kg $MOLE^{-1}$ (as opposed to 0.012 kg $mole^{-1}$ in SI), so that:

$$Nm_{^{12}C} = \mu_{^{12}C} = 12 \text{ kg } MOLE^{-1}. \qquad (2)$$

This gives N the value of

$$N = 6.022 \times 10^{26} \text{ MOLE}^{-1}. \qquad (3)$$

This is a factor of 10^3 greater than the usual definition of the Avogadro constant. Thus, a MOLE is the amount of substance which contains as many elementary entities as there are in 12 kg of ^{12}C; 1 MOLE of ^{12}C has a mass of 12 kg.

Now consider a quantity of substance with n entities, each of mass m [kg]. The total mass, M [kg], of the substance is

$$M = nm. \qquad (4)$$

The quantity of substance, Q, measured in MOLES, is

$$Q = n/N. \qquad (5)$$

The molar mass, μ [kg $MOLE^{-1}$], is defined as

$$\mu = M/Q. \qquad (6)$$

With (4) and (5), therefore

$$\mu = Nm. \tag{7}$$

Eliminating N with (1), this may be written as

$$\mu = \frac{m}{m_r/\mu_r}. \tag{8}$$

With ^{12}C as the reference, this states that the molar mass is the ratio of the mass of the molecule to 1/12 of the mass of one atom of ^{12}C. For the molar mass of molecular oxygen, $\mu(O_2)$ [kg MOLE^{-1}], and substituting from (2), this gives

$$\mu(O_2) = \frac{m_{O_2}}{\frac{1}{12} m_{^{12}C}} \text{ kg MOLE}^{-1}. \tag{9}$$

In (9), the factor 12 has brought the units of kg MOLE^{-1} into the equation; molar mass as defined here has dimensions of kg MOLE^{-1}. Inverting (6), gives

$$M = \mu Q \tag{10}$$

which underlines this result, since if Q = 1 MOLE, then M is numerically equal to μ.

It may be noted that the numerical value ascribed to $\mu(O_2)$ in (9) depends upon the definitions of mass [kg] and quantity of substance [MOLE]. It is useful to define a unit-free *relative* molecular (atomic) mass (RMM), with

$$\text{RMM}(O_2) = \frac{m_{O_2}}{\frac{1}{12} m_{^{12}C}}. \tag{11}$$

where 12 is a pure number, without any associated units. Combining (9) and (11), and dropping the reference to O_2, gives

$$\mu = \text{RMM kg MOLE}^{-1} \tag{12}$$

In the SI system this equation is[5]

$$\mu = 0.001 \text{ RMM kg mole}^{-1}, \tag{13}$$

which is clearly unsatisfactory. Difficulty and confusion concerning these quantities is widespread[3,4], and arises from the mistaken definition of the mole.

While the old definitions are internally consistent, it seems to be neither helpful nor necessary to be compelled to use, in round figures, molar masses of 0.001, 0.032 and 0.180 kg mole^{-1} for atomic hydrogen, molecular oxygen and glucose, rather than 1, 32 and 180 kg MOLE^{-1}, as is proposed here. In many sciences, including plant and crop physiology, where interdisciplinary work is of increasing importance, it is unsatisfactory to use the SI mole as presently defined, and also unnecessary because a better definition is easily constructed as shown above. As the current definition of the mole is based more on the gram than the kilogram (so that the molar mass of carbon is 12 g mole^{-1}), it would also help if some unprefixed name and symbol were found to replace the kilogram and kg. This would clearly identify the kilogram as the fundamental SI unit for mass. It may be noted that a concentration of 1 mole litre^{-1} is equivalent to 1 MOLE m^{-3}.

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Mistake of the month

Every issue of *Chemistry International* sees at least one good mistake in the magazine. In the March 1990 issue, Prof. G.J. Leigh was the unfortunate victim of the issue's most noticeable editorial error. On page 57, in the Commission & Committee News section, we referred to Prof. Leigh as Geoff, since (a) close colleagues call him by a name sounding like 'Geoff' and (b) we (mistakenly) presumed that the G in Prof. G.J. Leigh stood for Geoffrey. However, the *New Scientist* (10 February 1990, page 55) revealed that Prof. Leigh is known as 'Jeff'. The editor of *CI* immediately apologized on the telephone to Prof. Leigh who informed him that the G stood for George and the J for Jeffrey.

WORTH READING: 'Metals set a trap for nitrogen' by Jeff Leigh (*New Scientist* 10 February 1990, pp. 55–58). Just when the chemists thought they understood how bacteria fix nitrogen, biologists found mutant microbes that do it differently. The search for a model that can explain the process reveals some fascinating chemistry.

Chemistry and the Environment

The IUPAC Programme

The first meeting of the IUPAC Coordinating Committee on Chemistry and Environment Programme took place at the IUPAC Secretariat, Oxford in March this year. This article examines the background to this new IUPAC mission-oriented programme and reports on the meeting.

Introduction

Discussions within the IUPAC Bureau and Executive Committee during the period 1987–89 focused on restructuring of the Union, so as to be able to respond more readily and effectively to the changing worldwide needs of chemistry. A main conclusion reached was that there should be in place at any one time at least three 'horizontal' interdisciplinary mission-oriented programmes involving several divisions/commissions.

In February 1989, the then President, Valentin Koptyug, Vice-President Yves Jeannin and Secretary General Tom West took an initiative towards the first such horizontal programme – Chemistry and the Environment – by holding preliminary talks in Paris with the Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU) and also with the United Nations Environment Programme (UNEP).

CCCEP meeting in Oxford: (from left) standing – Tom West, Lewis Coles, Valentin Koptyug, Mo Williams; seated – Norbetto Montalbetti, Gerrit den Boef, Dieter Wyrsch.

As a basis for more detailed consideration of the collaborative role to be played by the Union, the IUPAC Information Officer, Dr Michael Freemantle, was asked to prepare a booklet, with abstracts, of relevant reports issued during the period 1984–89 by IUPAC bodies together with summaries of their current projects. A preliminary compilation was submitted to the IUPAC Executive Committee when it met in Lisbon in April 1989. Suggestions put forward by the Executive Committee at and following the Lisbon meeting were incorporated into a second draft which was then submitted to Bureau members at the 35th IUPAC General Assembly held at Lund, Sweden in August 1989.

At this assembly, the Bureau approved the initiation of the first mission-oriented programme on Chemistry and the Environment. Koptyug was appointed overall co-ordinator of this programme with subcoordinators to have responsibilities for six broad topics.

- Analytical procedures for determination of chemicals in air, water, soil, living organisms, and food (subcoordinator: Gerrit den Boef, President, Analytical Chemistry Division)
- Measurement of physicochemical parameters relevant to the environment (subcoordinator: Gerrit den Boef)
- Transfer and transformation of chemicals in the environment (subcoordinator: Lewis Coles, President, Applied Chemistry Division)
- Toxicology of synthetic and natural substances (subcoordinator: Norbetto Montalbetti, President, Clinical Chemistry Division)
- Prevention of pollution of the environment (subcoordinator: Kirill Zamaraev, Bureau member and immediate Past-President of Physical Chemistry Division)
- Chemical safety (subcoordinator: Dieter Wyrsch, Chairman, Committee on Chemistry and Industry)

Chemistry and the environment booklet

The first task of the co-ordinators was to complete the preparation of, publish and disseminate IUPAC's *Chemistry and the environment* booklet. It was agreed that the final version of the booklet should also include details of IUPAC's recent and current projects which are closely or indirectly related to environmental chemistry together with relevant new projects initiated at the Lund General Assembly.

The booklet contains abstracts of IUPAC reports on environmental topics published during the 6-year period ending March 1990. Most of the reports were published in the Union's official journal *Pure*

'Analytical procedures for determination of chemicals in air, water, soil, living organisms, and food' is one of six topics in the IUPAC Chemistry and Environment Programme.

and Applied Chemistry. Reference is also made to published proceedings of IUPAC-sponsored conferences, in particular, the IUPAC programme of conferences on CHEMical Research Applied to World Needs (CHEMRAWN). In addition, the booklet includes details of environmental projects initiated by the Committee on Teaching of Chemistry and articles on chemistry and the environment published in *Chemistry International*.

Each section contains abstracts of ongoing projects, which are grouped, for convenience, into six chapters corresponding to the six topics listed earlier. The abstracts were extracted from archive material at the IUPAC Secretariat, including project initiation proposals and revision sheets. All these projects were ongoing at March 1990.

The following IUPAC divisions, commissions and committees all contributed reports, abstracts of which appear in this booklet.

Inorganic Chemistry and Clinical Chemistry Divisions:

- Limited Life Time Joint Commission (formerly, Working Party) on Isotope Specific Measurements as References for Toxic/Essential Element Assays.

Analytical Chemistry Division:

- Subcommittee on Electroanalytical Methods of Environmental Trace Analysis
- Subcommittee on Environmental Analytical Chemistry (now a Limited Life Time Commission)
- Commission on Microchemical Techniques and Trace Analysis
- Commission on Analytical Nomenclature
- Commission on Electroanalytical Chemistry
- Commission on Radiochemistry and Nuclear Techniques
- Commission on Solubility Data

Applied Chemistry Division:

- Commission on Food Chemistry
- Commission on Biotechnology
- Commission on Oils, Fats, and Derivatives
- Commission on Atmospheric Chemistry
- Commission on Agrochemicals (formerly Commission on Pesticide Chemistry)
- Commission on Water Chemistry

Clinical Chemistry Division:

- Commission on Toxicology

Committees

- CHEMRAWN Committee
- Committee on Chemistry and Industry
- Committee on Teaching of Chemistry

Free copies of booklet available to affiliates

Copies of the 64-page illustrated book on *The IUPAC programme on chemistry and the environment* have been distributed to members of IUPAC commissions and committees, national adhering organizations and other bodies associated with IUPAC.

A limited number of free copies are available to IUPAC affiliates who have completed and returned their yellow 1990 registration forms to the IUPAC Secretariat.

To apply for a copy, please write to the Affiliate Affairs Secretary at the IUPAC Secretariat.

The booklet on *Chemistry and the environment* contains abstracts of ongoing projects grouped into six chapters including one on 'Prevention of pollution of the environment'. *(Photo courtesy Shell Photographic Service.)*

The Oxford meeting

The first meeting of the chief co-ordinator and his subcoordinators (see above) of the IUPAC mission-oriented Chemistry and the Environment Programme was held at the IUPAC Secretariat, Oxford, 5–6 March 1990. The meeting was chaired by Prof.

Valentin Koptyug. Secretary General Tom West, Executive Secretary Mo Williams, Information Officer Michael Freemantle and Clinical Chemistry Division Past-President Stan Brown were also in attendance.

It was recommended that, whilst the main scientific environmental activity would remain within the divisions and sections of the Union, the co-ordinating work should be undertaken by a standing committee. This committee would consist of the chief co-ordinator and his appointed subcoordinators and be called 'Coordinating Committee on Chemistry and Environment Programme' (CCCEP).

Freemantle tabled the third draft of the booklet described above. He pointed out that relevant new projects approved at Lund had been incorporated, and the text with illustrations were ready for printing. The committee carefully checked the new projects for their relevance to the environment and, with some minor changes, agreed that production and distribution of 4000 copies should go ahead.

Koptyug tabled a first draft compilation of information on international organizations and programmes related to chemical and biochemical aspects of environmental problems. The intention is to produce an information booklet for both internal and external distribution. West felt that the final compilation might be published in *Pure and Applied Chemistry*, so that offprints could be more widely distributed. Koptyug also tabled a preliminary draft document of the IUPAC Programme on Chemistry and the Environment with other environmental programmes.

The subcoordinators then drew attention to efforts being made by their respective divisions with regard to environmental activities. The importance of liaising actively with organizations such as FAO and WHO was continually stressed.

The committee discussed several proposals for new environmental projects. These included two presented by Koptyug from Zamaraev (who was unable to attend the meeting) on the following topics:

At the Oxford CCCEP meeting, Koptyug tabled a first draft document containing a compilation of information on international organizations and programmes related to chemical and biochemical aspects of environmental problems.

- kinetic data evaluation for application in modelling studies of global atmospheric chemistry; and
- role of surface and colloid chemistry (including catalysis) in environmental protection.

Zamaraev also suggested that a letter should be sent to all IUPAC company associates, requesting the provision of information on: (a) the new 'breakthrough' technologies developed by them within the last few years in order to manufacture various products in an ecologically safe manner; (b) the new technologies developed by them to minimize pollution; and (c) measures taken at plants throughout the world to minimize pollution. However, the committee agreed to accept an alternative proposal from Wyrsch to collect a set of relevant brochures from major chemical companies.

The CCCEP is scheduled to meet again in September 1990 in conjunction with the Bureau meeting at Milan. The committee will also meet again in Hamburg immediately before the 36th IUPAC General Assembly in 1991.

Chemistry and the environment

Stockholm 1989

On Wednesday 2nd August 1989, Birgitta Dahl, Swedish Minister of Environment and Energy, opened the 32nd IUPAC Congress in Stockholm. The following is the text of her address.

Introduction

It is with special satisfaction that I note that you are devoting such a large part of the congress to environmental problems.

Certainly, there are tremendous problems and challenges associated with what we are in the habit of describing as the chemical society. At the same time, I should like to point out that there is a risk that the environmental debate on chemicals is becoming extremely simplified.

Chemistry and chemicals are two broad concepts. There is a tendency to see everything concerning chemicals as being suspect, as being nothing else but a threat.

'There is a risk that the environmental debate on chemicals is becoming extremely simplified.'

The emissions of environmentally hazardous chemicals are irrefutably the other side of the so-called 'chemical society', a murky backyard where today we only know small nooks and crannies. In full view, out in the open, is the fact that chemicals are used in nearly all industrial operations and as a result contribute to our welfare. Numerous are the examples of how chemical know-how and new advances have helped us to solve difficult problems.

We have put ourselves, however, in a position of dependence on these products, as a result of which a long-term strategy is required if we are to cope with the problems *and* prevent new ones.

Swedish Minister of Environment and Energy Birgitta Dahl at the 32nd IUPAC Congress in Stockholm.

Environmental problems

We know that the majority of the serious environmental problems that we are wrestling with today are caused by the development of the industrial society in the post-war years. Let me mention a number of facts as an illustration of this:

- During the past 100 years, industrial production has increased more than 50-fold. Four-fifths of the increase has taken place since 1950.
- The consumption of fossil fuels has increasd 30-fold in 100 years: two-thirds of the increase has taken place since 1950.
- Every year the increase in the consumption of raw materials in industrial production and processes is the equivalent of the total consumption during the whole of the 1930s.
- In a corresponding manner, we have experienced during the post-war period a veritable explosion in the number of new chemical substances.

It is consequently clear that the rapid material and raw material turnover *in itself* increases environmental problems. The environmental crisis cannot be separated from a discussion of the volumes of toxicity in substances, goods and products.

This also goes to show that we must survey the whole production chain in order to obtain a true picture of the environmental consequences of the industrial society. The alternative cannot be, however, to say no to chemicals altogether. We should then have to say no to everything.

Nevertheless, it is important to establish the fact that if we are only talking about the substances that nature can manage to degrade, our problems could be coped with. However, when we talk about stable substances, as is the case with many chemical substances, the complexity and difficulty of the problems are at a completely different level. And here it is necessary for the community and the world of research to earmark considerable resources.

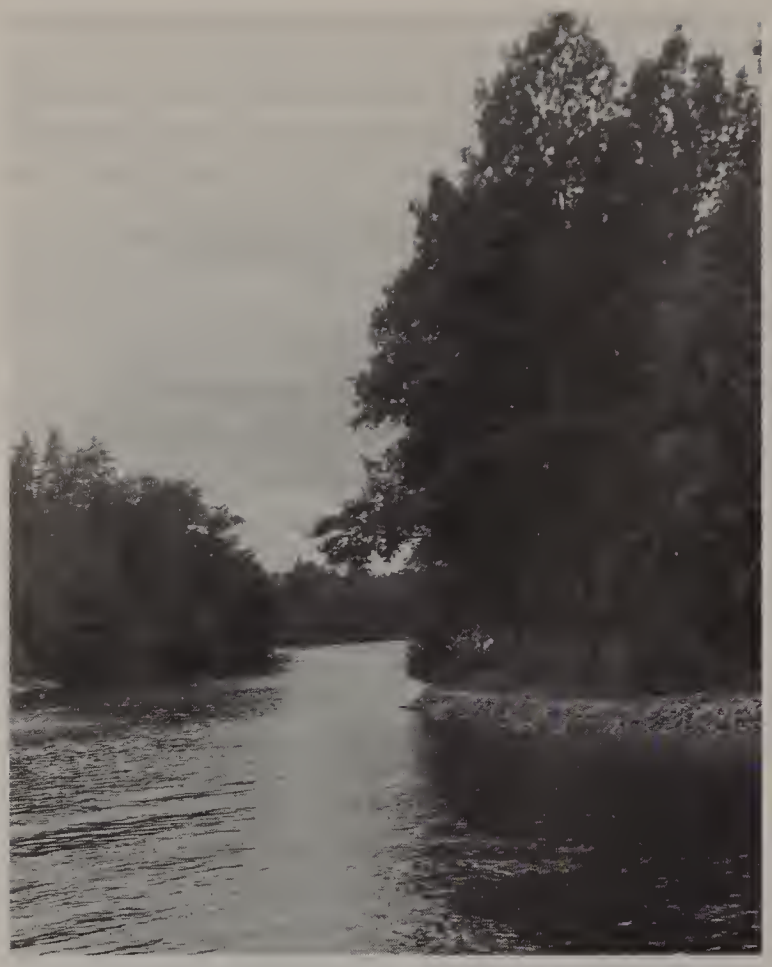
IUPAC
STOCKHOLM
1989

Alternatives needed

Allow me to draw attention to some sectors where we need alternatives to today's chemicals and/or today's processes:

- *Solvents*, particularly chlorinated ones. Methylene chloride, trichloroethylene and perchloroethylene are some of those for which we need less harmful substitutes – or alternative methods so that we can avoid using them.
- *Flame-resistant agents*. Many are poisonous bromine-containing compounds that often are not readily degradable. Yet they are now found in the countryside.
- *Plastic materials* that are degraded into harmless substances when they have served their purpose.
- *Chemical pesticides* are a fourth sector into which we in Sweden pour a lot of our resources to reduce the use and the dangerous nature of the substances employed.

This leads me to a line of reasoning as to where the challenges of the future in the environmental sector lie. I am now primarily talking about a



'There are no stretches of water, no soil and no air that have escaped being affected by industrial emissions.'

Swedish perspective but I maintain that the description applies to most of the industrialized world – and in a wider perspective also to the development of the poor countries.

Many people have become accustomed to seeing emissions from industrial processes, that is to say smoke billowing from chimneys and stinking waste water, as the very symbol of post-war environmental problems. This picture was true in the early environmental debate, but today it is only partly true.

In a typical picture from the 1960s, it was possible to describe the area round the outlet of a waste water pipe as more or less dead. At the same time we only had to go some 20 or 30 miles from the 'pipe' to find that the latter areas were for the most part unaffected.

Today the factory and industrial surroundings that may be described as dead are considerably fewer in number. Areas adjacent to industrial emissions have been cleaned up substantially. On the other hand, there are no stretches of water, no soil and no air that have escaped being affected.

The local problems have been replaced by regional and global problems.

During the last 20 years great efforts have been made to improve the environment. For example, in Sweden, industrial emissions of mercury into the atmosphere and into water have decreased by more than 90% since 1960. Developments are similar for other environmentally hazardous substances.

Naturally enough, this description does not mean that all the problems have been solved.

An important conclusion to be drawn is therefore that at the same time as we see definite possibilities of squeezing the emissions from industrial processes down to what may be termed 'harmless levels', other problems increase in scale. This applies to the environmental problems of traffic, the energy supply and agriculture.

This is very true of what we in the wide sense of the term describe as the community's flow of goods, the whole life cycle of the goods from raw material to consumption and refuse. If anything, the things that come out through the factory gates or the back door, the refuse, are the problem rather than the direct emissions into the atmosphere and water.

The chemical sector

The above kind of analysis makes it necessary to view the chemical sector as decisive for solving environmental problems.

And it is we who are alive today, in the rich countries of the world, who have the chance and pre-requisites for being the driving force along the road to sustainable development.

For the first time in history we can see the overwhelming majority of our population enjoying decent standards of living. We are also in a position to use our knowledge and strength to develop new and environmentally sound technologies.

A basic standpoint in Swedish legislation on chemical control has for a long time been the view that a mere suspicion of risk found on valid scientific grounds is sufficient reason for taking measures in respect of a particular product.

Already, in a Swedish Chemical Bill from 1973, it is stipulated that a producer of chemicals must prove that a suspicion is unfounded. If he is unable to do so, he must agree to his product being classed as hazardous to health and to the environment. This is the so-called reversed burden of proof. In the mid-

Market in centre of Stockholm: 'as consumers we all have a responsibility – environmentally conscious consumers are an underestimated force'.

1980s this principle was further clarified to mean that a substance should be regarded as having a suspected hazardous effect until there is sufficient reason for stating that this is not the case.

Three basic conditions for the continuation of environmental efforts in the chemical sector must be established:

1. the companies producing or using chemical products have the main responsibility;
2. International intergovernmental co-operation in the chemical sector is of crucial importance; and
3. as consumers we all have a responsibility – environmentally conscious consumers are an underestimated force.

One part of the strategy that we have chosen in Sweden as well as in other industrial countries is to make a distinction between new chemicals and old ones already present on the market.

In order to get a grasp of developments in the chemical sector, it is necessary for new chemicals to be examined and tested before they are launched on the market. In Sweden, we have this kind of system as regards the use of pesticides and herbicides. The Government is now preparing an extension of the system of advance examination to include other new chemical substances as well.

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International activities

With well over 100 000 different substances on the market, no chemical inspectorate in the world can conduct on its own the necessary evaluation, classification and labelling of all products.

Work within the Organization for Economic Cooperation and Development (OECD) is especially important. Some years ago governments reached agreement on a system for testing *new* chemicals and the toilsome task of testing all *old* chemicals has started. Twelve nations and one regional organization have now submitted lists of high production volume chemicals to the OECD Secretariat. These lists have been analysed for overlaps and a consolidated OECD representative list developed. This list now contains 1338 chemicals.

On the initiative of two OECD member countries (FRG and Sweden), the OECD has begun work on these high production volume chemicals in close collaboration with the two organizations of the United Nations: the International Programme on Chemical Safety (IPCS) and the International Registry of Potentially Toxic Chemicals (IRPTC). These chemicals have been sorted out into groups according to the availability of data and priorities have been set for the development of data on those most lacking in information. This work has been extremely fruitful.

The OECD working group on the high production volume chemicals has identified a list of chemicals for which data are incomplete or almost totally lacking. Within this group of chemicals an order of priority has been established, where the highest priority has been accorded to chemicals where no readily available data seem to exist.

Congress participants listen intently to the Minister's address at the opening ceremony.

The next step in the process is to determine the kind of information needed about these chemicals. The group has been working on the assumption that high volume chemicals should be regarded as an entity and that for such an entity a generic approach should be used; that is to say, the same type of information should be asked for.

This co-operation places exacting demands on the OECD member countries. The project in respect of existing substances stands or falls on the efforts of the participating countries.

My government also strongly believes that we should strive for common rules and regulations in as many countries as possible *provided* that the rules are set at an ambitious level. The Ministry of Environment and Energy recently published a study in which we analysed the European Community (EC) rules and corresponding Swedish rules. This analysis shows us that although Sweden and the EC have basically the same approach to testing, evaluation and labelling, the Swedish rules are stricter than those in other West European countries.

On the *global* scale, I would like to mention the recently agreed Convention on the Transport of Hazardous Waste. The convention is a success for the United Nations Environmental Programme (UNEP).

As we see it, the Basel Convention is a major but first step towards restricting the trade in hazardous waste, especially with those countries with a poor capacity for handling the waste, notably the developing countries. I said first step and I say this advisedly because we would like to see a much more far-reaching agreement.

The subject of hazardous waste will play an important role at the 1992 UN Conference on Environment and Development. UNEP has now decided to recommend the UN General Assembly to convene a conference 20 years after the Stockholm Conference. A major topic will be the handling of hazardous waste and toxic chemicals.

Conclusion

I mentioned earlier in this address some examples of the many new challenges facing us in the environmental sphere in general and the chemicals sector in particular. Sectors where inquisitive and intelligent researchers have a definite role.

I should like to conclude my address by expressing the hope that we shall promise one another that during the next 30–45 years we will use all available research resources and all our skill, know-how and technology to guarantee a viable environment for all life on earth. If we do this we must surely succeed.

I hope and believe that in the work ahead of us, IUPAC and its members will be a driving force.

Organometallic chemistry in Florence

The 5th IUPAC Symposium on Organometallic Chemistry directed towards Organic Synthesis took place in Florence, Italy in October 1989.

Introduction

Over 600 chemists attended the 5th IUPAC Symposium on Organometallic Chemistry directed towards Organic Synthesis (OMCOS–V) held in Florence from Monday 2nd October to Friday 6th October 1989. Previous symposia in the OMCOS series have been held in Fort Collins, USA (1981), Dijon, France (1983), Kyoto, Japan (1985) and Vancouver, Canada (1987).

OMCOS–V was organized by the Universities of Florence and Pisa where research in the field of organometallic chemistry is a major activity. The chairmen were Giuseppe Casnati (Parma), Alfredo Ricci (Florence) and Pierro Salvadori (Pisa).

The meeting was formally opened at 'Palazzo dei Congressi' in Florence. Organic Chemistry Division President Irina Beletskaya (Moscow, USSR) was official IUPAC representative at the meeting. On behalf of IUPAC President Yves Jeannin she presented the greetings of the Union and wished the participants a successful meeting.

After the opening ceremony and each following day plenary lectures alternated with invited lectures, short oral presentations and poster sessions. In all, there were eight plenary lectures, 17 invited lectures, 88 oral presentations and 133 posters devoted to the following main topics:

- Synthesis of molecules of biological interest via organometallics
- Metallo-enzymes in organic synthesis

Florence, venue of OMCOS–V.

Organic Chemistry Division President Irina Beletskaya was official IUPAC representative at the meeting.

- Synthesis of fine chemicals via organometallics
- Selective synthetic processes mediated by organometallic compounds

Asymmetric synthesis made easy

Following the opening ceremony, IUPAC affiliate and 1979 winner of the Nobel Prize for Chemistry Herbert C. Brown (West Lafayette, USA) presented a plenary lecture on 'Asymmetric synthesis made easy: an unexpected bonus from a half-century of borane research'.

In his lecture, he pointed out that a currently active area of organic research is the development of synthetic methods to produce pure enantiomers at will. Considerable progress is being made. In the course of their studies of organoborane compounds, Brown and his co-workers at Purdue University have discovered a general synthesis of pure enantiomers.

In 1956 it was discovered that the simplest hydrogen compound of boron, B_2H_6, diborane, adds to unsaturated organic compounds with remarkable ease. The products are organoboranes. Investigations of these organoboranes revealed that they have a rich chemistry, greatly facilitating the synthesis of a vast host of organic compounds.

The substitution reactions of organoboranes reveal a unique feature. They proceed with complete retention of structure and configuration. Consequently, the attachment of a pure enantiomeric group to boron via asymmetric hydroboration with di- and mono-isopinocampheylborane now makes possible the synthesis of pure enantionmers containing any function group desired.

Metallo-imines

On Monday afternoon, Gianfranco Cainelli (Bologna, Italy) presented a plenary lecture on 'Metallo-imines: useful reagents in organic synthesis'. He reported on the preparation of aluminium, silicon and tin imines from nitriles, and enolizable as well as non-enolizable aldehydes and ketones. These synthetically very promising organometallic compounds display high electrophilic behaviour.

Ester enolates react with them to produce β-lactams in fair to good yields. These have been used in the synthesis of non-classical β-lactam antibiotics such as penems, carbapenems, and monolactams. Primary amines have also been prepared in good yields using metallo-imines. Finally, metallo-imines, obtained from chiral α-hydroxy aldehydes such as starting materials, allow the preparation of α-aminoalcohols and β-lactams with high diastereo- and enantioselectivity.

The symposium was held in the Palazzo dei Congressi (above).

During the meeting, participants were invited to an organ concert by Father Ermanno Vandelli at the Church of Santa Croce (below). The church, probably built in 1294, houses frescoes by Giotto and is famous for the illustrious people buried there: Machiavelli, Michelangelo, Galileo and Rossini.

Nucleic acid synthesis

Ryoji Noyori (Nagoya, Japan) gave a plenary lecture on 'Organometallic methodologies for nucleic acid synthesis' on the Tuesday morning of the meeting.

He reported that a new general way to 2′–5′-linked oligoadenylates has been opened, which relies on: (1) chemoselective *O*-phosphorylation of *N*-unblocked nucleosides via hydroxyl activation by Grignard reagents; (2) construction of internucleotide linkage using bifunctional phosphorylating agents; and (3) selective production of a 3′,5′-di-*O*-protected adenosine.

This solution-phase synthesis allows large-scale preparation of a wide range of related oligomers. Palladium chemistry coupled with allylic protection of functional groups leads to development of an efficient solid-phase synthesis of DNA oligomers via the phosphoramidite approach.

Allyl groups on internucleotide linkages and allyloxycarbonyl groups on sugar hydroxyls and amino moieties of nucleobases are removable all at once on the polymer supports by exposure to the palladium(0) complex and nucleophiles. This procedure has been used for synthesis of a DNA 60mer of unprecedented high purity.

IUPAC affiliate and Nobel Prize winner Herbert C. Brown lectured on organoboranes and the synthesis of pure enantiomers.

Structure–reactivity relationship

Wednesday morning opened with a plenary lecture by Dieter Seebach (Zürich, Switzerland) on 'Structure–reactivity relationship in organometallic reagents'.

Seebach described and discussed examples of the effects of additives or by-products on the reactivity of lithium and copper derivatives in view of the structures of these organometallic compounds as determined in solution and in the crystalline state. Among the additives are: alkali and alkaline earth salts; titanates; amides; butyllithium; secondary and tertiary chelating amines; and dimethylpropylene urea.

The reactions studied were lithium and copper enolate and dienolate alkylation/hydroxyalkylation; addition of polylithiated and polyfluorinated lithium nitronates to aldehydes and ketones; *Michael* addition to methylene dioxanones and to dioxinones with enolate trapping; C,C-bond formation with polylithiated peptides; and directed depolymerization of polylithiated polyesters.

The crystal structures included a lithiated carboxylic acid amide hexamer.

Asymmetric hydroxylation and epoxidation

On Wednesday afternoon, John T. Groves (Princeton, USA) lectured on 'Asymmetric hydroxylation and epoxidation catalysed by vaulted binaphthyl metalloporphyrins'.

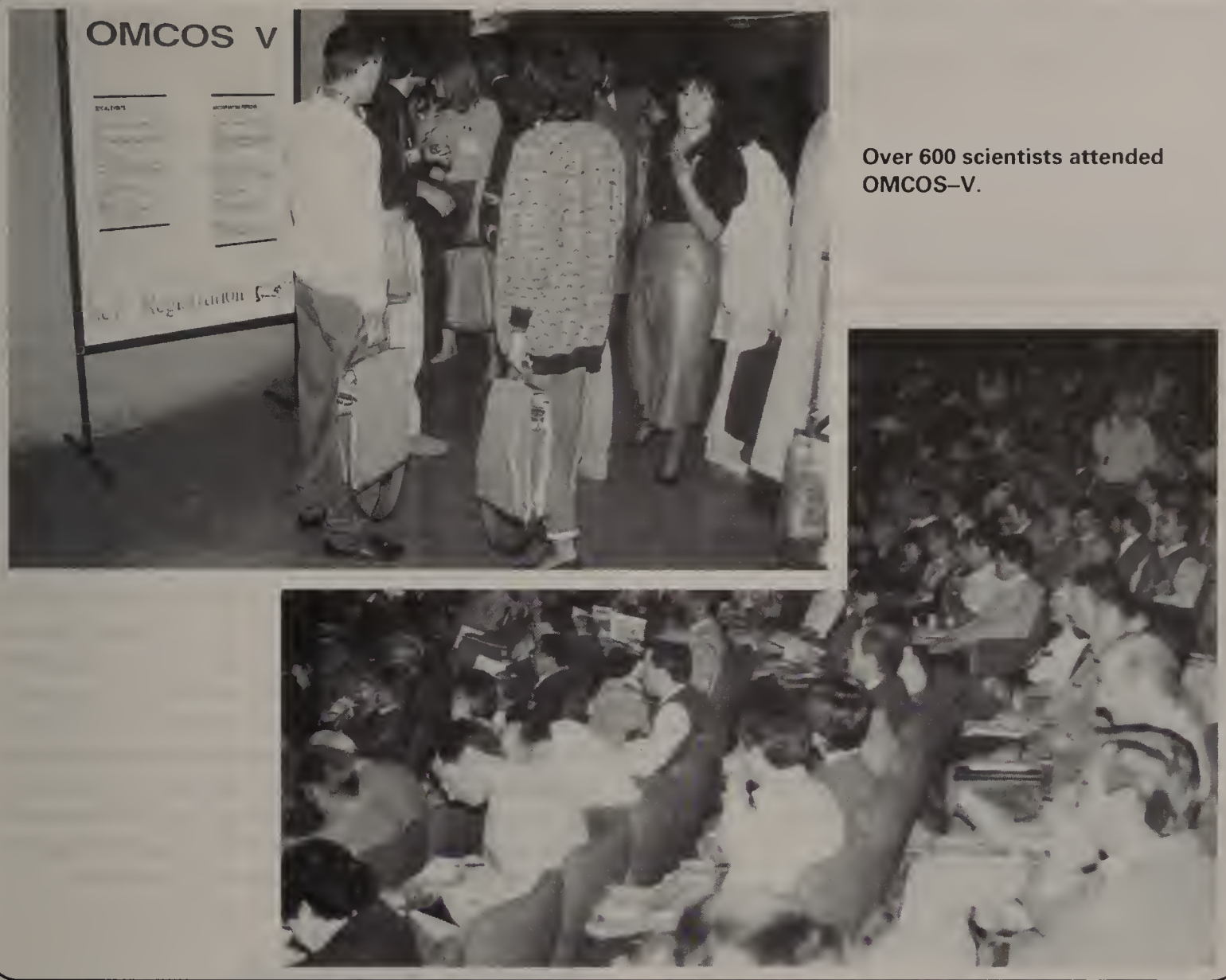
He reminded the audience that asymmetric synthesis has emerged as a rich and rapidly developing area of chemistry, combining elements of organic synthesis, molecular recognition, metal co-ordination chemistry and catalysis. Of the various strategies for exploiting the available pool of chiral compounds, catalytic asymmetric induction offers the distinct advantage of chemical amplification of the asymmetry of the catalyst.

The enzymic epoxidation of simple olefins such as 1-octane has been shown to proceed with very high enantiomeric excesses (80–100%). In such cases there can be no auxiliary, bonded interactions between the catalytic centre and the substrate. Accordingly, it must be possible to develop synthetic catalysts with chirotropic cavities which can mimic this high enantioselectivity.

The discovery that iron porphyrins will catalyse alkane hydroxylations and olefin epoxidations in the presence of oxygen donors such as iodosylbenzene has provided an opportunity to use synthetic porphyrins for modelling the oxygen transfer reaction of cytochrome P-450. Chiral metalloporphyrins have been shown to mediate catalytic asymmetric oxgyen transfer to afford optically active epoxides from prochiral olefins.

The largest enantiomeric excess reported to date (ee = 51%) has been provided by an iron porphyrin catalyst with chiral binaphthyl appendages. In his lecture, Groves described the synthesis and characterization of a new, vaulted porphyrin with a chirotropic binaphthyl bridge.

The iron(III) and manganese(III) derivatives of this porphyrin have proven to be robust catalysts for olefin epoxidation and sulfoxidation providing catalytic ee's as high as 72%. Most significantly, the first catalytic asymmetric hydroxylation with similarly high ee's have been observed with this catalyst. Groves discussed aspects of the mechanisms of asymmetric oxygen transfer reactions.



Over 600 scientists attended OMCOS–V.

Chromium carbene complexes

The remaining three plenary lectures were given by Louis S. Hegedus (Fort Collins, USA) on 'Chromium carbene complexes in the synthesis of molecules of biological interest'; Herbert Lehmkuhl (Mulheim, FRG) on 'Specific reactions of organometallic complexes with unsaturated hydrocarbons'; and Nobel Prize winner in chemistry Jean-Marie Lehn (Strasbourg, France) on 'Co-ordination compounds as molecular devices'.

Hegedus reported the development of several new synthetic approaches to functionalized chromium aminocarbene complexes making a wide array of complexes, including those containing chiral auxiliaries, available.

Photolysis of these chiral carbene complexes in the presence of imines produces chiral, optically active β-lactams in high chemical and optical yield. Procedures for removal of the chiral auxiliary to produce the optically active free amino β-lactams have been developed.

Hegedus has shown that photolysis of chromium carbene complexes produce species which react as if they were ketenes or metal-bound ketenes. Photolysis of aminocarbene complexes, synthesized from the reaction of amides with $Na_2Cr(CO)_5$ and trimethylsilyl chloride, in the presence of methanol produced α-amino esters in excellent yield, providing an efficient, unusual two-step transformation of amides to α-amino acid derivatives. Chiral, optically active aminocarbene complexes produced chiral, optically active α-amino acids in excellent yield.

Procedures to efficiently α-alkylate simple (methyl) (amino) chromium carbene complexes have been developed. Photolysis of these homologated carbene complexes in the presence of alcohols produced *homo*alanine derivatives in excellent yield, showing the (methyl) (amino) carbene complex to be an alanine homoenolate equivalent. Chiral, optically active aminocarbene complexes were similarly homologated and photolysed to produce optically active *homo*alanine derivatives.

Photolysis of aminocarbene complexes in the presence of α-amino esters produced dipeptides. Hegedus presented preliminary results in the application of this methodology.

Commission & Committee News

Environmental thrust for Water Chemistry Commission

With both the chairman and secretary of the Commission on Water Chemistry (VI.6) retiring, this commission meeting at Lund was something of a watershed. The opportunity was taken to review the commission's objectives, composition and, in the light of this, its future and existing projects.

Water Chemistry Commission Chairman, Dr Tony Dobbs.

The reformulated objectives proposed provide a more 'environmental' thrust than hitherto and concentrate on the scientific basis of issues connected with environmental quality, protection and standards of water. A secondary aim is for the commission to act as a vehicle for information exchange and collation which will be of value to both developing and developed countries.

Of the six existing projects, one on 'concentration units in water chemistry' has been successfully completed with a paper published in *PAC* (Vol. 61, No. 8, pp. 1511–1515, 1989).

Two projects connected with waste water treatability tests have been combined and the project completion date brought forward to 1990. A discussion paper on test methods is being prepared by the outgoing chairman Mr Lars Lindfors, for the next commission meeting.

Two projects have been terminated because of lack of information and progress, and another on leaching tests for hazardous wastes is being completed with the production of a discussion paper by Dr Miriam Waldman, also for consideration at the next meeting.

Three new projects were proposed.

- Environmental fact sheets — a series of these are proposed. These will present, in plain language, issues relating to water chemistry which are of concern and interest to politicians, the press and the general public. Fact sheets on topics such as 'zero discharges of chemicals' and 'no effect concentrations' will be supported by scientific papers.
- A workshop on the 'Behaviour of pesticides in water catchments — modelling and land use practices' will be held jointly with the Commission on Agrochemicals in Stockholm in September. This will be a closed workshop. The papers and discussions will be published.
- A joint project with the International Association on Water Pollution Research and Control will be concerned with the implications of the use of amount concentration units in water chemistry for regulatory and monitoring purposes.

Dr Miriam Waldman is preparing a discussion paper on leaching tests for hazardous wastes.

Two discussion papers are being prepared for consideration as future projects. One is concerned with the regulation and control of organic and inorganic contaminants in sewage sludge. This is being prepared by Prof. Franz Malz. The other is concerned with the contribution of atmospheric deposition to water pollution and is being prepared by Dr Tony Dobbs.

If anyone has information which they believe would be of interest or relevance to these papers,

Franz Malz and Tony Dobbs would be pleased to hear from them.

(Prof. F. R. Malz: Emschergenossenschaft and Lippeverband, Kronprinzenstrasse 24, D-4300 Essen, FRG. Tel: +49 (201) 104500.

Dr. A. J. Dobbs: Water Research Centre, Medmenham Laboratory, POB 16, Henley Road, Medmenham, Marlow, Buckinghamshire SL7 2HD, UK. Tel: 44 (491) 571531. Telex: 848632 G Fax. +44 (491) 579094.)

The next meeting of the commission will be held in Stockholm, 8 September 1990.

Tony Dobbs

Harmonization of quality assurance schemes for analytical laboratories

The Interdivisional Working Party for Harmonization of Quality Assurance Schemes for Analytical Laboratories (Divisions V, VI and VII) met at the 35th IUPAC General Assembly, Lund from 10 to 12 August 1989.

The aim of the working party is to develop protocols which are acceptable to industrial, national and international organizations for (1) the adoption of methods standardized by collaborative study, and (2) the presentation of performance characteristics in the texts of those methods.

The need to develop these protocols derives from the fact that (a) methods with unsatisfactory performance characteristics have in certain cases been adopted for publication as standard methods, (b) precision clauses in standard methods have often been presented in formats which, although statistically sound, are of little practical value to the user of the standard, and (c) other performance characteristics of methods, for example, accuracy (trueness), limit of detection and so on, have generally not been indicated in the texts of the standardized methods. A paper containing these protocols was finalized at the general assembly for publication in *PAC*.

At the Lund meeting the working party also discussed the results of the 3rd International Symposium on the Harmonization of Quality Assurance Systems in Chemical Analysis, Washington, DC, USA, 19–20 April 1989 (see *CI*, Vol. 12, No. 1, pp. 31–33, 1990).

The symposium accomplished its purpose of providing the many different viewpoints on how to accomplish the common objective of ensuring the reliability of analytical results. Statisticians, both theoretical and practical, have indicated how to control variability, regardless of its source. Industrial, professional, and regulatory organizations, national and international, have provided examples of ongoing programmes.

There is no lack of recognition of the necessity of quality assurance because vast programmes of profound potential influence on the future of mankind are based upon the results of analytical chemistry work. All agree that management support is indispensable for the success of a quality assurance programme.

'. . . vast programmes of profound potential influence on the future of mankind are based upon the results of analytical chemistry work'.

The proceedings of the Washington symposium have been published in a volume of 215 pages. However, members of the working party agreed that in order to draft a protocol on the subject another symposium was necessary with a more limited scope and a narrower selection of invited lecturers.

The fourth symposium will take place in Geneva at ISO headquarters from 2 to 3 May 1991. Dr C. J. Favre, Deputy Secretary-General of the International Organization of Standardization kindly offered to host this symposium and agreed to welcome participants at the opening ceremony.

The next meeting of the working party is scheduled for November 1990.

Michael Parkany

Biophysical chemistry

Prof. Ingemar Wadsö welcomed members of the Steering Committee on Biophysical Chemistry at the Lund General Assembly. Prof. Brigitte Heinritz (FRG) reported that a brief article on the activity of the working party was published in *CI* in 1989. She also reported that a 15 page article on the importance of thermodynamic data for protein stability in biotechnology was being prepared for publication in *PAC*.

The committee decided to organize a workshop/satellite meeting on protein stability in connection with the 11th IUPAC Conference on Chemical Thermodynamics which will be held in Como, Italy, 27–31 August 1990.

Prof. W. Pfeil (GDR) presented his data compilation on protein stabilty. Originally it was planned that the project should grow to a rather broad database. However, Pfeil judged his resources to be too limited to allow him to continue the work. Following discussions among members of the working party the committee decided to terminate the project in its present form. Pfeil will publish the existing compilation in a forthcoming issue of the Landolt–Börnstein tables.

Prof. K. Niki (Japan) reported that a draft paper on 'Definitions and concepts of electrochemical biosensors' has been prepared. The paper will be submitted for publication in *PAC* during 1990.

Many meetings at the IUPAC General Assembly took place in the Hotel Sparta, Lund. The IUPAC Secretariat was located in the hotel for the duration of the assembly.

Dr Lisbeth Ter-Minassian-Saraga (France), co-ordinator of the project on 'Guidelines for preparation, characterization and terminology concerning vesicles' reported that a 12 page draft has been prepared and that the project will be finished in 1981. A brief article about this project will be submitted for publication in *CI*.

The committee agreed to initiate the following three projects (co-ordinators in brackets): Compilation of thermodynamic data on enzyme catalysed reactions (R. N. Goldberg); Guidelines for the measurements of redox potentials of proteins — Joint project with the Commission on Electrochemistry, I.3 (K. Niki); Standardization of databases on protein structures determined by NMR in solution (K. Wüthrich).

The committee also decided to conduct the following feasibility studies: Data on the thermodynamic stability of natural and mutant proteins (J. Schellman); Guidelines for terminology for spectroscopic characterization of organized molecular systems — in particular the biomembrane mimetic system (L. Ter-Minassian-Saraga); Compilation of kinetic and mechanistic data for enzymatic and other processes involving proteins (A. Shilov); Are there terminology problems in the field of biometrics which require attention of the steering committee at the present time? (A. Shilov); Guildelines concerning the use of physico-chemical methods for the characterization of a cellular system — Joint project with the Commission on Biotechnology, VI.2 (B. Heinritz and H. Dellwig); Standardization of nomenclature of engineering proteins and definitions of terms and symbols for protein stability and protein folding processes — Joint project with Commission VI.2 (B. Heinritz, J. Schellman and L. Gierisch); Terminology and nomenclature in studies of energetics of living systems (I. Wadsö); Possible future projects in electrochemistry: (i) Chemistry of redox mediators, (ii) Data compilation of redox potentials of biological molecules and other molecules of biological significance (K. Niki).

Ingemar Wadsö

Guidelines for drafting IUPAC recommendations

The following 1990 guidelines for drafting new documents involving IUPAC recommendations or other technical reports have been prepared by IUPAC's Interdivisional Committee on Nomenclature and Symbols.

Introduction

These guidelines are offered by the Interdivisional Committee on Nomenclature and Symbols (IDCNS) to those writing or planning to write documents for publication by IUPAC.

IDCNS has the task of ensuring that the contents of new recommendations documents concerned with nomenclature, symbols or definitions of terms are consistent with previous publications of the Union. The committee also scrutinizes IUPAC technical documents of a more specialized nature for consistency of nomenclature and symbols usage.

Attention by authors to such matters at an early stage of writing (or even planning) a document will speed substantially the acceptance procedures for publication that IDCNS carries out on behalf of the Union. Nothing is more annoying for the authors of a document, who have worked hard to reach technical agreement on the contents with their colleagues, than to be asked subsequently to make multiple changes for consistency within IUPAC.

The situation with respect to ensuring consistency with earlier IUPAC pronouncements has been much facilitated in principle by the recent publication of two reference works of rather general

importance, namely the *Compendium of chemical terminology* (the 'Gold Book'[1]), and *Quantities, units and symbols in physical chemistry* (the 'Green Book'[2]), to be discussed below.

The first effect of their availability has been a more efficient alerting of members of IDCNS to their responsibilities, with a consequence that documents submitted to the committee during the past 2 years have attracted more numerous requests for modification than previously. This situation can best be avoided in the future by ensuring that document authors also have these reference works available to them at the earliest possible stage in their work. To this end, the IUPAC Secretariat will send to the newly appointed chairman and secretary of each commission copies of the 'Gold' and 'Green' books, and other nomenclature books relevant to their division, for use by their members. By agreement with the division presidents, the books will be charged to division funds.

In addition, authors of documents are invited to send their first full, or even partial, draft to one of their two division representatives on IDCNS, whose names are listed in the *IUPAC handbook*, for advice on whether or not they are adequately adhering to IDCNS/IUPAC requirements. The division representatives are asked to respond speedily, with only general and helpful comments, and not to scrutinize the document in a detailed manner at this stage.

A full scrutiny will later be carried out by IDCNS members on completed documents as part of the procedure laid down by the Bureau and as set out, for recommendations documents, in the *IUPAC handbook*. Technical documents, which should not contain new material on symbols, nomenclature or definitions, are checked by officers of IDCNS prior to submission for publication in *Pure and Applied Chemistry*.

Time and effort will be saved if this IDCNS scrutiny is carried out prior to the preparation of camera-ready copy. If the author of a document is not a native English speaker, then it will frequently be profitable to consult an English speaker for use of idiom et cetera prior to submission to IDCNS via the division president and the IUPAC Secretariat.

IDCNS meeting in Oxford, September 1988. The committee has the task of ensuring that the contents of new recommendations documents concerned with nomenclature, symbols or definitions of terms are consistent with previous IUPAC publications.

Definitions of terms

Authors are in general free to choose the format, style and content of their documents. However, if the document contains multiple definitions of terms, as in a glossary, it is particularly helpful if these are numbered individually and laid out in separate paragraphs for easy subsequent incorporation into later editions of the 'Gold Book'[1]. Definitions can be followed by separate explanatory notes and examples, as required.

In compiling a glossary, the current edition of the 'Gold Book' should be inspected in case a particular term has been defined previously within IUPAC. If it has, but there is a need to repeat the definition, then whenever possible the original wording should be retained. If it is considered essential to change the wording, for example, if the original is too technical for a more general readership, or general terms need to be replaced by more specific ones for a narrower readership, then the changes made should be kept to a minimum and the justifying reasons given in a footnote, together with a reference to the original 'Gold Book' entry.

In certain areas, and particularly in metrology, it is important for IUPAC to retain consistency with definitions given by 'higher authorities' such as the *International vocabulary of basic and general terms in metrology* (VIM[15]) and the International Organization for Standardization (ISO[16,17]). The definitions given by these bodies are agreed after much international consultation, and they have official status in connection with trade and/or legal usage. Again any required rewordings for different usage should be specified and justified.

Abbreviations

BIPM	International Bureau of Weights and Measures (Bureau international des poids et mesures)
IDCNS	Interdivisional Committee on Nomenclature and Symbols (of IUPAC)
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
IUB	International Union of Biochemistry
IUPAC	International Union of Pure and Applied Chemistry
OIML	International Organization of Legal Metrology (Organisation internationale de métrologie légale)

The IUPAC document should always fully list other sources that have been consulted for purposes of consistency. General references to the others consulted should be made within the document; more specific references need be given only when changes to the original are made as discussed above.

Abbreviations and acronyms tend to be understood by limited groups of practitioners. They should be used sparingly and always defined once in any document (the 'Green Book', section 1.6)[2,4]. For the same reason, general laboratory slang pertaining to a particular field should not be used in written reports as this will often not be understood by readers versed in related areas of chemistry who nevertheless wish to gain an understanding of the new field.

Nomenclature

Nomenclature in all areas of chemistry is continuously under development within IUPAC, and the pages of *Pure and Applied Chemistry* should be consulted for recent recommendations. Several important book-form compendia exist: for inorganic chemistry consult the 'Red Book'[5]; for organic chemistry consult the 'Blue Book'[6]; and for analytical chemistry consult the 'Orange Book'[10].

Copies of these will be sent to officers of commissions within the relevant division. A compendium of *Biochemical nomenclature*[13] was compiled under the aegis of the IUPAC–IUB Joint Commission on Biochemical Nomenclature. A book-form compendium of *Macromolecular nomenclature* (the 'Purple Book') will be published shortly. In the interim, references 7–9 list some pertinent articles.

In the preparation of nomenclature documents it is also helpful, as for definitions, if individual rules are given in numbered paragraphs together with explanatory notes and examples, as required.

Symbols

The 'Green Book'[2] provides an up-to-date account of IUPAC requirements in these areas. An abbreviated list is also available. During the writing of the 'Green Book' careful harmonization was made with analogous recommendations from ISO and from the International Union of Pure and Applied Physics (IUPAP).

Certain rules in the 'Green Book' must be strictly adhered to, namely the use of italic letters for symbols for physical quantities and roman letters for units (section 1.3) and the instructions for the printing of numbers and mathematical symbols (section 4.1).

When a document includes recommendations for a number of new quantities and symbols, as may often happen in dealing with a specialized area of chemistry, it will generally be helpful to provide a summary table of all quantities included in the document, similar to the tables in chapter 2 of the 'Green Book', with the headings: *Name, Symbol, Brief defining equation, SI unit,* and *Notes*. Tables of this kind allow the reader to recover important information quickly when referring to a document for the second or third time, and allow easy comparison between different documents.

The specific use of quantities and units in clinical chemistry is discussed in references 11 and 12.

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8. Nomenclature of regular single-strand organic polymers. *Pure Appl. Chem.* Vol. 48, pp. 375–385, 1976.
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Analytical chemistry

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11. Quantities and units in clinical chemistry: IUPAC recommendations. *Pure Appl. Chem.* Vol. 51, pp. 2451–2479, 1979.
12. List of quantities in clinical chemistry: IUPAC recommendations. *Pure Appl. Chem.* Vol. 51, pp. 2481–2502, 1979.

Biochemistry

13. *Biochemical nomenclature and related documents.* Reprinted in 1978 for The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK. Update due for publication 1990.

Quantities, units and general metrology

14. *Le Systeme International d'Unités* (with English translation). Bureau International des Poids et Mesures, Pavillon de Breteuil, F-92310 Sèvres, France, 1985.
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16. *Units of measurements. ISO Standards Handbook 2.* (Contains: ISO 1000 and ISO 31/0 to 13.) ISO, Geneva, Switzerland, 1982. Available from booksellers (ISBN 92-67-10051-3) and from national standards institutions.

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17. *Statistical methods. ISO Standards Handbook 3.* (Contains especially: ISO 3534 Statistics — vocabulary and symbols.) ISO, Geneva, Switzerland, 1981. Obtainable only from national standards institutions.

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19. *IUPAC notes for contributors.* Blackwell Scientific Publications, Oxford.

Provisional Recommendations

IUPAC seeks your comments

In this section we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *Pure and Applied Chemistry* and synopses of these published in *CI* as recent reports.

If you would like to comment on the provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the IUPAC Secretariat. The most up-to-date list of national/regional centres appeared in *CI*, Vol. 11, No. 2, p. 67, 1989.

JCAMP-DX, a standard format for exchange of infra-red spectra in computer readable form

The project committee recommends the use of JCAMP-DX to standardize infra-red spectral data for ease in transmission between infra-red spectrometer data systems and between such systems and other computers. .

JCAMP-DX is a standard file format that supplies specifications for encoding digitized spectral data, including all the information about a sample (such as sample preparation and properties), instrumental parameters, and sampling and computational procedures.

The digital output (the spectra, interferograms, transformed spectra, and peak tables) from any type of infra-red spectrometer can be handled using JCAMP-DX. Data encoded using JCAMP-DX specifications consist of printable ASCII characters and are acceptable to all computers and data systems.

The committee recommends that data be carefully documented within JCAMP-DX files. IUPAC-acceptable names and units should be used. Restrictions are applied to some of the JCAMP-DX specifications and additional requirements are given in order to meet IUPAC standards.

Comments on the document should be sent by 28 February 1991 to: Dr J. G. Grasselli, 150 Greentree Road, Chagrin Falls, Ohio 44022, USA.

Revised nomenclature for radicals, ions, radical ions and related species

The IUPAC Organic Nomenclature Rules contain a subsection codifying nomenclature recommendations for radicals, ions, and radical ions (C–O.8), which are illustrated in various recommendations in Sections B, C, and D. Although these recommendations embody all the requirements for a general system of nomenclature of radicals, ions, and related species, they have often been interpreted narrowly and do not deal thoroughly with some types of compounds, for example, those containing different formal charges in the same parent structure.

This revision retains the essential principles of previous organic nomenclature recommendations for radicals and ions and extends them to include parent compounds of the non-metallic elements,

certain semi-metallic elements, and to some characteristic groups. Established principles from other IUPAC nomenclature commissions have been incorporated and, where appropriate, alternative methods under study by the Commission on Nomenclature of Organic Chemistry are noted. In addition, a method for describing structural fragments containing radicals as prefixes and a suffix for indicating the addition of hydride ions to a parent hydride are introduced.

These revised recommendations for naming radicals, ions, radical ions, and related species do not deal exhaustively with all aspects of their nomenclature. For example, delocalization is not included even though it was briefly treated in the 1979 Rules; this aspect of their nomenclature is currently under study by the commission. The recommendations presented are concerned only with classical valence structures and are not concerned with concepts of paired and unpaired electronic configurations.

Comments on the document should be sent by 28 February 1991 to: Dr W. H. Powell, Chemical Abstracts Service, POB 3012, 2540 Olentangy River Road, Columbus, Ohio 43210, USA.

Glossary of terms used in biotechnology for chemists

The glossary contains definitions and explanatory notes, if needed, of over 230 terms frequently used in publications in the multidisciplinary field of biotechnology.

The glossary was developed as a step to help facilitate communication between chemists, chemical engineers, biologists and bioengineers and to make biotechnology and its methodologies more accessible to the chemical profession. The interrelation between chemistry, chemical engineering and the burgeoning areas of molecular biology will be especially important as chemical industrial processes begin to incorporate recombinant DNA techniques for example.

The range of terms includes microbiology, genetic engineering, biochemistry, molecular biology, biochemical engineering, bioprocessing and general concepts of biotechnology.

Comments on the document should be sent by 28 February 1991 to: Prof. B. Nagel, Academy of Sciences of the GDR, Institute of Biotechnology, Permoserstra e 15, 7050 Leipzig, GDR.

PAC Review

Pure and Applied Chemistry (*PAC*) is IUPAC's offical journal. It publishes the main invited lectures of symposia sponsored by the Union; the recommendations of its Commissions on nomenclature, symbols and units and technical reports on standardization, recommended procedures, collaborative studies and data compilations. Summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports appearing in *PAC* are published in *CI* in the section *Recent Reports*. In this section we take a brief look at the symposia and lectures published in recent issues of *PAC*.

Surface chemistry, adsorption and chromatography

About 250 scientists from 23 countries attended the International Symposium on Surface Chemistry, Adsorption and Chromatography which took place in Moscow, USSR, from 13 to 17 November 1988.

The symposium was dedicated to the memory of A. V. Kiselev. Prof. K. D. Shcherbakova (Moscow, USSR) reported on Kiselev's contribution to the science of adsorption, intermolecular interactions and chromatography.

Lectures on the following subjects were then presented.

1. Investigations on general aspects of adsorption thermodynamics and chromatography.
2. Investigations concerning the problems of adsorption on heterogenous surfaces using computer simulations.
3. Investigations of porous structures of various adsorbents.
4. Determination of thermodynamic characteristics of adsorption by calorimetry and chromatography.
5. Physico-chemical aspects of gas–liquid chromatography.
6. Modification of various adsorbents and investigation of their surface chemistry by different methods.
7. Application of selective adsorbents and bonded stationary phases for preparation of high quality columns for chromatography.

The Moscow International Symposium on Surface Chemistry, Adsorption and Chromatography was dedicated to the memory of A. V. Kiselev. Below his profile, from left to right are: W. Engewald (GDR); D. H. Everett (UK); K. S. W. Sing (UK); R. A. Pieretti (USA); Yu. S. Nikitin (USSR) and Symposium Chairman O. G. Larionov (USSR).

In the first section, Prof. K. S. W. Sing, Chairman of the IUPAC Commission on Colloid and Surface Chemistry including Catalysis (I.6) lectured on the multilayer adsorption and the concept of the standard isotherm. Sing was official IUPAC representative at the symposium.

Amongst the contributors to the symposium was IUPAC affiliate Dr S. N. Lanin from M. V. Lomonosov State University, Moscow. His paper, which was co-authored by Dr Yu. S. Nikitin, was entitled 'Intermolecular interactions and selectivity of polyaromatic hydrocarbons separation in liquid chromatography'.

About 250 scientists attended the Moscow symposium.

The paper described a mathematical modelling method and the principle of additivity for investigations of intermolecular interactions and selectivity of polyaromatic hydrocarbons separation in high performance liquid chromatography. Their proposed correlation equations showed good correlation for all chromatographic systems under investigation and can be used to predict retentions of different substances.

Lectures from the Moscow symposium were published in the November 1989 issue of *PAC*.

Electronic structure and properties of molecules and crystals

Linus Pauling (Palo Alto, USA), winner of the Nobel Prize for Chemistry in 1954 was one of the plenary lecturers at the IUPAC-sponsored International Symposium on the Electronic Structure and Properties of Molecules and Crystals held in Dubrovnik-Cavtat, Yugoslavia, 29 August to 3 September 1988.

In his lecture on 'The nature of metals' Pauling described how the resonating-valence-bond theory of metals was first developed in 1938 and further advances made in the years 1947–49. This theory explains the nature of the bonding in metals and alloys and the characteristic properties of such substances.

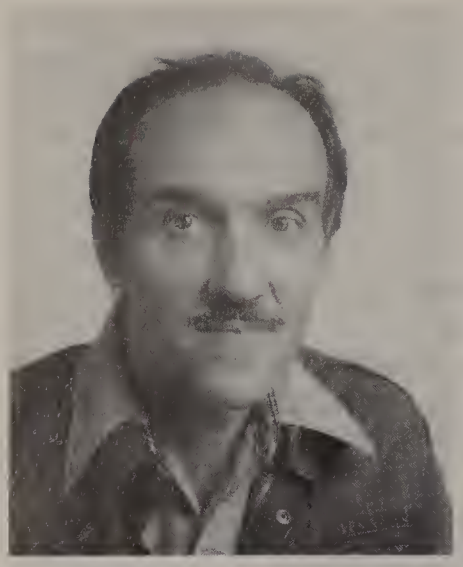
One of the principal ideas in this theory, that on average 0.72 of an outer orbital per atom must be unoccupied by bonding electrons in order to permit the unsynchronized resonance that confers metallic properties on a substance, was based largely on empirical evidence. Substantial theoretical advances have been made in the development of this approach during the past few years.

Among other things, the origin of this orbital (the 'metallic orbital') has been found through the use of a statistical treatment, rooted in the principles of quantum mechanics, of unsynchronized resonance of covalent bonds in a metallic substance with atoms restricted by the electroneutrality principle to forming $v - 1$, v, or $v + 1$ bonds, with v the valence.

Recent applications of the theory have been the development of a multiple twinning explanation of the so-called icosahedral quasi-crystals and the development of a set of principles determining the structures of metals under high pressures.

Conjugated-circuits models

Pauling's lecture, along with other plenary and invited lectures, was published in the December 1989 issue of *PAC*. They include a paper by IUPAC affiliate Douglas J. Klein, Professor of Marine Sciences at Texas A & M University at Galveston, USA, and Prof N. Trinajstić of The Rugjer Bošković Institute, Zagreb, Yugoslavia.



IUPAC affiliate Douglas Klein.

Their paper, entitled 'Foundations of conjugated-circuits models' opens with a quote:

'Physical laws should have mathematical beauty'
P. A. M. Dirac

Klein and Trinajstić derive a Simpson–Herndon model Hamiltonian defined on a space of orthogonal Kekulé structures for 1-factorable polyhex species (for example, benzenoid hydrocarbons) from either of two antecedent models.

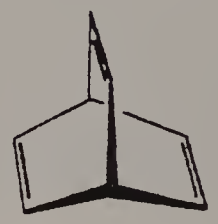
One antecedent model is the semi-empirical valence-bond model treated in the simple resonance-theoretical approach of Pauling and Wheland. The other is the Pariser–Parr–Pople model treated within the bond-orbital resonance-theoretical approach of Zivković. Finally, they obtain the conjugated-circuit scheme of Randić, though in modified form.

Ab initio heats of formation

IUPAC affiliate Jerome M. Schulman is one of three scientists from the City University of New York, USA, who are authors of a paper on '*Ab initio* heats of formation of medium-sized hydrocarbons-10. Studies of barrelene and related compounds' presented at the conference.

In the introduction, they point out that molecular heats of formation are at the foundation of thermochemistry. Until recently, these quantities were obtained experimentally using well-known measurements such as heats of combustion, vaporization, and hydrogenation. It is becoming clear, particularly for organic molecules, that theoretical methods can provide an important source of heats of formation.

For molecules which are difficult to prepare or to isolate in pure form, the need for theoretical methods is obvious. However, even for relatively common molecules, experimental methods sometimes give conflicting values (albeit to high precision). This is due in part to complicating effects of solvent, phase changes, catalysts, sample purity and size, and inaccuracies associated with small differences of large numbers. In the future, it is quite likely that theory and experiment will form a healthy partnership in the exploration of thermochemistry.

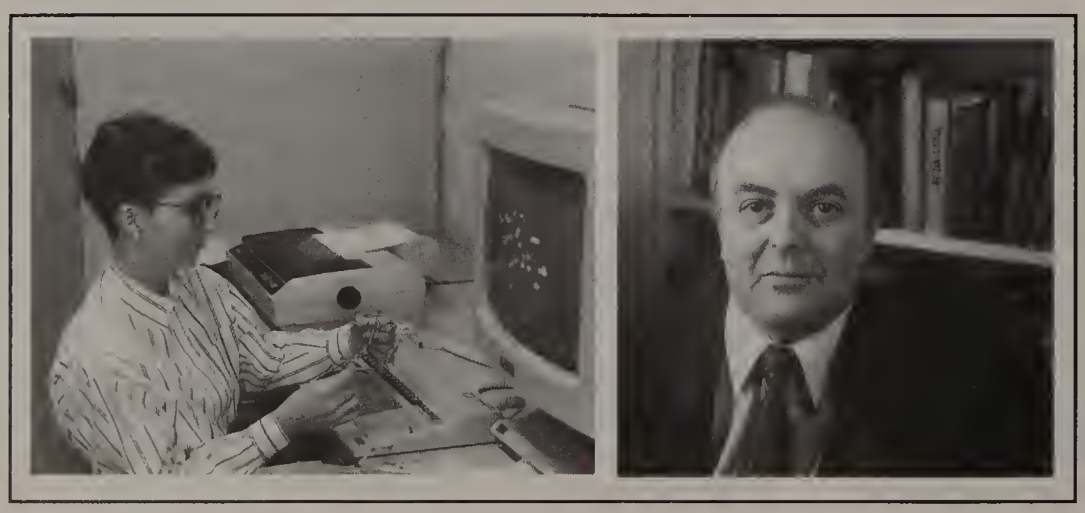


Barrelene.

Ab initio calculations can now be implemented in rather large basis sets, with geometry optimization, even for molecules of moderate size. Standardization of the basis sets has led to a large data base of *ab initio* energies and new strategies permit these energies to be employed in the accurate calculation of heats of formation. In their presentation the three New York scientists applied these methods to the thermochemistry of bicyclo[2.2.2]-octa-2,5,7-triene, commonly known as barrelene.

Solution chemistry

The January 1990 issue of *PAC* includes plenary and session lectures presented at the 12th International Conference on Solution Chemistry held in Jerusalem, Israel, 6–11 August 1989 and six plenary lectures presented at the 6th International Confer-

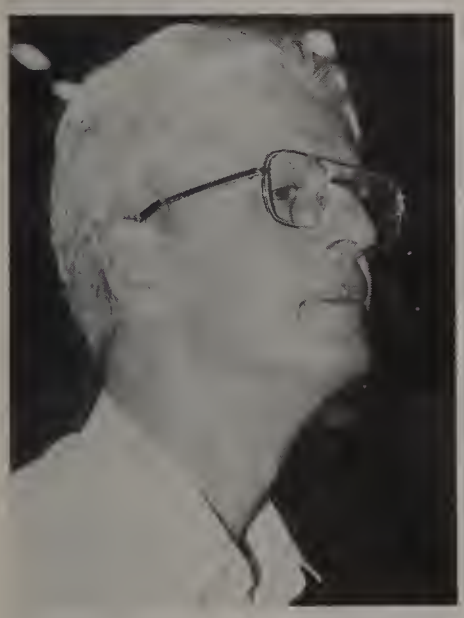


Jerome M. Schulman (right) is an IUPAC affiliate and Professor of Chemistry and Biochemistry at the City University of New York. Graduate student Rosalie Peck (left) is working with Schulman on the modelling of cholinergic drug-receptor interactions.

ence on High Temperatures — Chemistry of Inorganic Materials at High Temperatures held in Gaithersburg, Maryland, USA, 3–7 April 1989 (see *CI*, Vol. 12, No. 1, pp. 28–31, 1990).

Amongst the papers presented at the Jerusalem conference and published in *PAC* was one by IUPAC affiliates Robert W. Taft and S. Yazdani and eight other authors all from the University of California, USA. The paper is entitled 'Free energies of cation–molecule complex formation and of cation–solvent transfers'.

The paper reports extensive studies on the effects of molecular structure on gas-phase basicity towards Li^+. The Californian scientists show that both the magnitudes and the basicity orders differ markedly from the corresponding gas-phase basicities towards H^+. They present an analysis of these results together with some preliminary comparisons of basicity orders observed in other adducts having largely electrostatic bonds, that is for Al^+, K^+, Mn^+, and neutral hydrogen-bond donors. Taft, Yazdani and their co-workers also consider implications to ionic solvation energies of the differing basicity orders.



John Corbett (USA): one of the contributors at the Gaithersburg conference.

Also published in the January issue of *PAC* is a paper by IUPAC affiliate Karl Spear and Ryan Kirkx from Pennsylvania State University, USA, on the 'Role of high temperature chemistry in CVD (chemical vapor deposition) processing'. The paper was presented at the Gaithersburg conference. Other plenary lectures from this conference published in this issue of the journal include: 'Thermodynamic modelling of solution phases' (I. Ansara); 'Recent advances in the chemistry of gas phase transition metal clusters' (A. Kaldor and D. M. Cox); 'Chemical clusters from solid state systems at high temperatures: interstitials as a means to stability and versality' (J. D. Corbett, E. Garcia, Y.-U. Kwon and A. Guloy); 'Hot corrosion of materials' (R. A. Rapp); and 'Laser-pulse-vaporization of refractory materials' (D. A. Olander).

Nitroxide radicals

The February 1990 issue of *PAC* contains the plenary lectures presented at the International Conference on Nitroxide Radicals (ICNR–89) held in Novosibirsk, USSR, 18–22 September 1989.

The opening plenary lecture was presented by the conference chairman Leonid B. Volodarsky (Institute of Organic Chemistry, Novosibirsk). The paper, entitled 'Advances in the chemistry of stable nitroxides', discussed syntheses of new nitroxides by structure modifications of known carbocyclic and heterocyclic nitroxides and their diamagnetic precursors. Volodarsky also described syntheses of nitroxides with a functional group in close proximity to the radical centre and demonstrated a new route to pyrrolidine nitroxides.

He pointed out that much attention has been focused on 3-imidazoline and 3-imidazoline-3-oxide nitroxides owing to their stability to acids and oxidants, complexing ability and remarkable reactivity.

Affiliate contributions

IUPAC affiliate Larry Kevan (University of Houston, USA) and Piero Baglioni (University of Udine, Italy) contributed a plenary paper on 'Electron spin-echo modulation studies of ionic and nonionic micelle structure via stearic acid nitroxide probes'. The paper points out that electron spin-echo modulation is used to study the nuclear environment around a nitroxide moiety located at different positions on a stearic acid alkyl chain embedded in ionic and non-ionic micelles.

Using deuterium as nuclear labels the interface and internal structure of micelles can be probed. The conformation of the nitroxide probe and surfactant molecules is determined as the degree of water penetration into the micelle.

IUPAC affiliate T. J. Michalski (Argonne National Laboratory, USA) was one of four authors of a paper on 'Fourier-transform-EPR and low-frequency-EPR studies of nitroxides'. The nitroxide spin labels are a class of stable free radicals that have wide applications as probes of chemical and biological systems in electron paramagnetic resonance (EPR) experiments. Measurements of the concentration of paramagnetic species and of rotational or translational motion can be made using the relaxation times and the lineshape of the nitroxide probe.

The paper describes how, in the fast motional limit, the relaxation times are easily obtained from the conventional EPR spectrum if non-homogeneous broadening from the unresolved hyperfine couplings is not too great. Pulsed and Fourier-Transform EPR (FT-EPR) methods allow the measurements independent of non-homogeneous broadening.

Novosibirsk: city centre (right).

ICNR-89

A laboratory at the Institute of Organic Chemistry, Novosibirsk (above). Members of the ICNR–89 Organizing Committee and plenary lecturers (right).

In biological studies involving large aqueous samples, it is advantageous to use low-frequency EPR (LF-EPR) near 250 MHz to reduce microwave absorption from the sample. The nitroxide spin-label probes are as effective as LF-EPR as in the usual X-band EPR.

Topics of other plenary lectures included: polyfluorinated nitroxides; novel, potentially useful spin-label reagents; calibration of very fast alkyl radical 'clock' rearrangements using nitroxides; multidimensional EPR imaging of nitroxides; the use of nitroxides in viable biological systems: an opportunity and challenge for chemists and biochemists; the use of spin labels in looking at subtle conformational changes in blood coagulation proteins; studies of membrane dynamics using nitroxide spin labels; the use of nitroxides in the solution of some problems of chemical biophysics; the quest for a predictive design of anticancer drugs; and formation of free radicals in food constituents by γ-irradiation.

Recent Reports

In this section we publish summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports. The full texts of these recommendations and reports are published in *PAC*.

Recommended methods for the purification of solvents and tests for impurities: 1,2-ethanediol and 2,2,2-trifluoroethanol

1,2-Ethanediol

Specifications for the commercially available solvent, relevant physicochemical and key solvent properties are given. The procedures for the purification include the removal of oxidation products and of water. Gas chromatography is best for the detection of organic impurities.

2,2,2-Trifluoroethanol

The purity expected for the commercially available solvent, relevant physicochemical and key solvent properties are given. The procedures for the purification include drying and fractional distillation. Gas chromatography is best for the detection of organic impurities.

This report was prepared for publication by Y. Marcus, Commission on Electroanalytical Chemistry (V.5), Analytical Chemistry Division, and published in PAC, *Vol. 62, No. 1, pp. 139–147, 1990.*

Harmonized protocols for the adoption of standardized analytical methods and for the presentation of their performance characteristics

The development of two protocols, for the adoption of standardized analytical methods and for the presentation of their performance characteristics, is described. The two protocols were agreed, in principle, by the consensus of 34 participants at the 2nd IUPAC Harmonization Workshop held at Washington, USA, in April 1989, and adopted at Lund, Sweden, in August 1989, for publication as IUPAC Harmonized Protocols.

The first protocol outlines the criteria to be considered before adopting a method for publication as a standard method. The second protocol is concerned with the aspects of analytical quality control which are to be associated with the texts of all standard methods. Recommended formats for the drafting of essential information on analytical quality control (to be included in compendia of standard methods) are given, together with examples of precision clauses. Annexes list the names of the organizations and individuals who participated in the development of the harmonized protocols.

This report was prepared for publication by W. Dennis Pocklington, Interdivisional Working Party for Harmonization of Quality Assurance Schemes for Analytical Chemistry, Analytical, Applied and Clinical Chemistry Divisions, and published in PAC, *Vol. 62, No. 1, pp. 149–162, 1990.*

Inventory of current tropospheric sampling programs

The problems regarding network design and operation are such that harmonization and standardization of networks is called for. The value of the results obtained by networks is dependent on quality control measures. At present, comparison of results obtained by different networks is hampered by a lack of consistent quality control measures.

The design of many networks is not optimized in line with their objectives.

Sampling procedures are the most important source of errors. The available analytical methods for measurement of SO_2, NO_x, O_3, CO, CO_2 in air and of so-called bulk elements in precipitation are generally adequate for monitoring purposes. For other components the situation is less satisfactory.

Dr Sjaak Slanina (The Netherlands) prepared for publication the 'Inventory of current tropospheric sampling programs'.

This report was prepared for publication by S. Slanina, Commission on Atmospheric Chemistry (VI.4), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 1, pp. 163–176, 1990.*

Mass spectrometric determination of pesticide residues

This is No. 25 in the series IUPAC Reports on Pesticides.

A review is made of current approaches to mass spectrometry (MS) of pesticides, pesticide metabolites and related compounds such as PCBs and polychlorinated dibenzo-dioxins. Basic relationships between instrument sensitivity and detection limits in various operating modes are outlined.

Recent developments in instrumentation are introduced such as 'bench top' GC–MS, LC–MS, MS–MS and surface ionization techniques. Objective criteria are developed for interpretation of MS data for identification and quantitation of residues. The advantages of isotopically labelled internal standards to ultra trace analysis are highlighted. The recent literature on applications of MS to various pesticide classes are summarized.

The conclusions are that requirements for detailed residue data on crop protection and environmentally significant chemicals will increasingly rely on MS techniques as detection limits are lowered and the number of chemicals grows. MS applications are increasingly becoming polarized between routine confirmation of identity and sophisticated structural elucidation or ultra trace analysis.

This report was prepared for publication by P. T. Holland, Commission on Agrochemicals (VI.5), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 2, pp. 317–336, 1990.*

The prediction of pesticide residues in crops by the optimum use of existing data

This is No. 26 in the series IUPAC Reports on Pesticides.

The commitment of large resources to the provision and evaluation of data on pesticide residues in/on crops makes it vital to optimize the value of existing extensive information. Variations in the many (sometimes uncontrollable) factors which determine pesticide deposits on crops and their subsequent dilution and disappearance make the consideration of pesticide residues and the estimation of maximum residues levels an inexact subject.

A knowledge of these factors and their variability can reduce, or at least modify, the current regulatory requirements for expensive formal residues trials, which often have considerable limitations, both in their execution and in their interpretation. Information required for the successful prediction of pesticide deposits and residues at harvest is discussed and summarized in a recommended stepwise approach to the consideration of pesticide residues in crops.

This report was prepared for publication by J. A. R. Bates, Commission on Agrochemicals (VI.5), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 2, pp. 337–350, 1990.*

Microbial degradation of synthetic recalcitrant compounds

Man-made chemicals can often be degraded to varying extents by the natural microflora. Except for simple compounds such as chlorobenzoates, the biochemical and genetic basis of biodegradation is poorly understood.

Highly chlorinated compounds, which are not generally subject to rapid biodegradation, may be used as substrates for strains developed under strong selective pressure. Determining the catabolic pathways and defining the regulation of genes involved in degradation is critical for constructing improved bacterial strains capable of enhanced degradation of recalcitrant compounds.

This report was prepared for publication by Randi K. Rothmel and Ananda M. Chakrabarty, Commission on Biotechnology (VI.2), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 4, pp. 769–779, 1990.*

Prof Ananda Chakrabarty (University of Illinois College of Medicine, USA) was one of the authors of the report on 'Microbial degradation of synthetic recalcitrant compounds'.

The role and limitations of micro-organisms in the conversion of xenobiotics

This is No. 27 in the series IUPAC Reports on Pesticides.

The role of micro-organisms in the detoxification of pesticides is described. Basic processes of microbial conversion of pesticides are considered with characterization of the enzymes that bring about these bioconversions. Special attention is paid to the processes of microbial transformations of pesticides that lead to more recalcitrant and toxic intermediates compared to their parent compounds.

Micro-organisms prove to be responsible for both enhanced degradation of pesticides and formation of soil-bound pesticide residues and, conversely, their release. A few examples of such transformations are considered and causes underlying them are discussed. A separate section is devoted to the use of biotechnology in agriculture and to prospects of practical application of micro-organisms for degradation of pesticides.

This report was prepared for publication by L. A. Golovleva, N. Aharonson, R. Greenhalgh, N. Sethunathan and J. W. Vonk, Commission on Agrochemicals (VI.5), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 2, pp. 351–364, 1990.*

Training in clinical laboratory management (Guidelines 1988)

Trainees in laboratory medicine must develop skills in laboratory management. Guidelines are detailed for laboratory staff in training, directors responsible for staff development and professional bodies wishing to generate material appropriate to their needs.

The syllabus delineates the knowledge base required and includes laboratory planning and organization, control of operations, methodology and instrumentation, data management and statistics, financial management, clinical use of tests, communication, personnel management and training, and research and development.

Methods for achievement of the skills required are suggested. A bibliography of IFCC publications and other material is provided to assist in training in laboratory management.

This report was prepared for publication by N. De Cediel, C. G. Fraser, A. Deom, L. Josefsson, H. G. J. Worth and O. Zinder, Commission on Teaching of Clinical Chemistry (VII.3), Clinical Chemistry Division and Education Committee, International Federation of Clinical Chemistry. It was published in PAC, *Vol. 62, No. 2, pp. 365–372, 1990.*

Biotransformation — a useful tool in organic chemistry

This review discusses the characteristics, the methodology and the applications of biotransformations in organic chemistry. Biotransformations have successfully been employed to introduce chiral centres, to resolve racemates, to convert a particular functional group among several groups with similar reactivities, to functionalize a non-activated carbon regioselectively and to convert labile molecules due to the mild reaction conditions under which they take place.

Design and realization of combined chemical/biotechnological syntheses requires close interdisciplinary collaboration. Successful practical examples are discussed. In view of nature's immense reservoir of enzyme activities and the significant development in modern biotechnology, the application potential of biotransformations in organic chemistry is so far not yet exhausted.

This report was prepared for publication by H. G. W. Leuenberger, Commission on Biotechnology (VI.2), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 4, pp. 753–768, 1990.*

Determination of ester-emulsifier components content after hydrolysis and silylation by gas chromatography: results of a collaborative study and the standardized method

A method for the gas chromatographic determination of the components of ester-emulsifiers has been elaborated and tested in a collaborative study.

The method involves saponification of the ester-emulsifiers in ethanolic KOH solution, evaporation of the alcohol, silylation of the products of hydrolysis and determination of the component either by packed or capillary gas chromatography. The emulsifiers analysed in this study were mono- and diglycerides, diacetyl tartaric acid esters of mono- and diglycerides and sorbitan monostearate in oil (coconut oil). Emulsifiers present in oil were preliminarily separated by column chromatography.

The hydrolysis-silylation procedure described is applicable not only for the characterization and quantification of functional components of ester-emulsifiers, but also for oils, fats, wax esters and other hydrolysable lipids.

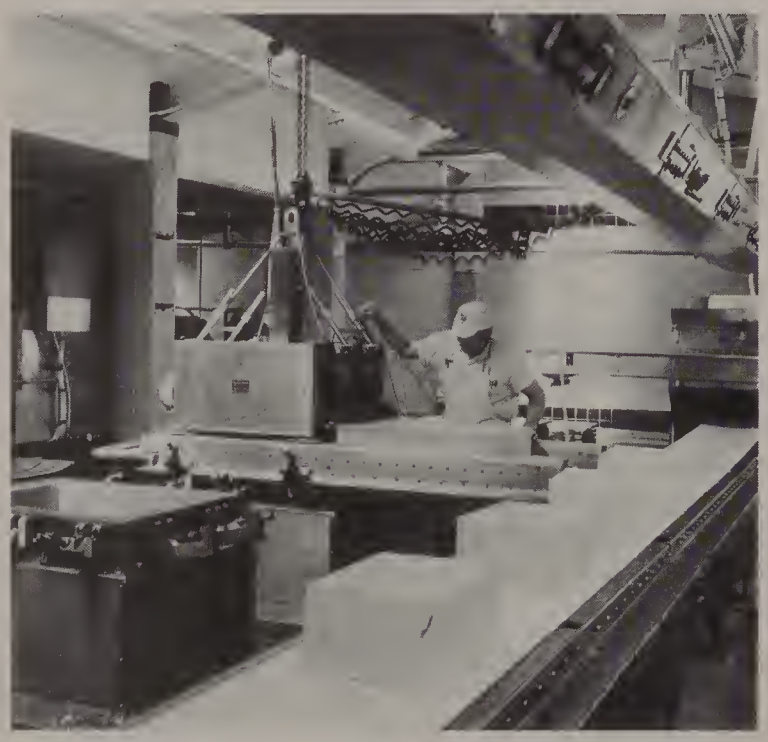
This report was prepared for publication by H. Brüschweiler and A. Hautfenne, Commission on Oils, Fats and Derivatives (VI.3), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 4, pp. 781–793, 1990.*

Publications

Fats for the future

'Fats for the Future II', an international conference on fats and oils was held from 12 to 17 February 1989 at the University of Auckland, New Zealand. The conference, which was sponsored by IUPAC and the Royal Society of New Zealand, followed the successful 'Fats for the Future I' conference, held in Auckland in 1983, which broke new ground in being the first on the subject in Australasia.

The second conference was attended by about 220 delegates representing 18 countries. It was aimed at exposing scientists, technologists, and business people, to the latest advances in the fields of oils and fats.



Cheese on a conveyor: 'Dairy fats – nutritional nasties or dietary delights?' is the topic of one of the chapters in *Fats for the future. (Photo courtesy National Dairy Council, UK.)*

Nineteen plenary lecturers and four invited speakers presented oral papers over a broad range of topics, including dietary lipids, health and nutrition, marine lipids, commercial utilization of lipids, marketing and development, palm and palm kernel oil, dairy lipids, and chromatography and analysis of lipids. These papers, presented by leading exponents in their fields, make up the content of the volume *Fats for the future.*

Fats for the future *is edited by R. C. Cambie and published by Ellis Horwood, Chichester, UK, 1989. × + 361 pp. ISBN 0-7476-0055-4. Price GBP 45.00.*

Chemistry in the primary school

The December 1989 issue of *International Newsletter on Chemical Education* (No. 32) is devoted to chemistry in the primary school. It includes the following reports.

- The renewal of chemistry teaching at compulsory school level in Italy: the contribution of Pisa University (A. Bargellini, L. Lardicci, G. Raspi and R. Riani, Universita di Pisa, Italy)
- Primary children do chemistry (J. Elstgeest, The Netherlands)
- Physical science in the primary science curricula of the Caribbean (W. K. King, University of West Indies, Barbados)
- School at the science musuem (E. Morris, Birmingham Museum of Science and Industry, UK)
- The primary science teaching action research (STAR) project (M. Schilling, University of Liverpool, UK)
- Basic science and the real world (E. W. Thulstrup, Royal Danish School of Educational Studies, Copenhagen)

ISO Standards

The following are some of the new international standards announced by the International Organization for Standardization (ISO) in recent issues of *ISO Bulletin.*

December 1989 issue of *ISO Bulletin*

TC 27	**Solid mineral fuels**
ISO 8833: 1989	Magnetite for use in coal preparation — Test methods.
TC 28	**Petroleum products and lubricants**
ISO 6743-12: 1989	Lubricants, industrial oils and related products (class L) — Classification — Part 12; Family Q (Heat transfer fluids).
ISO 6743-13: 1989	Lubricants, industrial oils and related products (class L) — Classification — Part 13: Family G (Slideways).
TC 45	**Rubber and rubber products**
ISO 4659: 1989	Rubber, styrene-butadiene (carbon black or carbon black and oil masterbatches) — Evaluation procedure.
ISO 8067: 1989	Flexible cellular polymeric

	materials — Determination of tear strength.
TC 59	**Building construction**
ISO 9047: 1989	Building construction — Sealants — Determination of adhesion/cohesion properties at variable temperatures.
TC 61	**Plastics**
ISO 1872-2: 1989	Plastics — Polyethylene (PE) and ethylene copolymer thermoplastics — Part 2: Preparation of test specimens and determination of properties.
ISO 1873-2: 1989	Plastics — Polyproplene (PP) and propylene-copolymer thermoplastics — Part 2: Preparation of test specimens and determination of properties.
ISO 2898-2: 1989	Plastics — Plasticized compounds of homopolymers and copolymers of vinyl chloride (PVC-P) — Part 2: Preparation of test specimens and determination of properties.
ISO 4588: 1989	Adhesives — Preparation of metal surfaces for adhesive bonding.
ISO 4613-2: 1989	Plastics — Ethylene/vinyl acetate copolymer (E*N*AC) thermoplastics — Part 2: Preparation of test specimens and determination of properties.
ISO 8328: 1989	Plastics — Amorphous thermoplastic moulding materials — Determination of maximum reversion.
ISO 8975: 1989	Plastics — Phenolic resins — Determination of pH.
ISO 9352: 1989	Plastics — Determination of resistance of wear by abrasive wheels.
TC 65	**Manganese and chromium ores**
ISO 6230: 1989	Manganese ores — Determination of size distribution by sieving.
TC 85	**Nuclear energy**
ISO 8529: 1989	Neutron reference radiations for calibrating neutron-measuring devices used for radiation protection purposes and for determining their response as a function of neutron energy.
TC 91	**Surface active agents**
ISO 893: 1989	Surface active agents — Technical alkane sulfonates — Method of analysis.
ISO 2271: 1989	Surface active agents — Detergents — Determination of anionic-active matter by manual or mechanical direct two-phase titration procedure.
TC 92	**Fire tests on building materials, components and structures**
ISO/IEC TR 9122-1: 1989	Toxicity testing of fire effluents — Part 1: General.
TC 119	**Powder metallurgy**
ISO 4491-1: 1989	Metallic powders — Determination of oxygen content by reduction methods — Part 1: General guidelines.
ISO 4491-2: 1989	Metallic powders — Determination of oxygen content by reduction methods — Part 2: Loss of mass on hydrogen reduction (hydrogen loss)
ISO 4491-3: 1989	Metallic powders — Determination of oxygen content by reduction methods — Part 3: Hydrogen-reducible oxygen.
ISO 4491-4: 1989	Metallic powders — Determination of oxygen content by reduction methods — Part 4: Total oxygen by reduction-extraction.
TC 129	**Aluminium ores**
ISO 9208: 1989	Aluminium ores — Determination of vanadium content — BPHA spectrophotometric method.
TC 147	**Water quality**
ISO 6060: 1989	Water quality — Determination of the chemical oxygen demand.
ISO 9509: 1989	Water quality — Method for assessing the inhibition of nitrification of activated sludge micro-organisms by chemicals and waste waters.
TC 155	**Nickel and nickel alloys**
ISO 7528: 1989	Nickel alloys — Determination of iron content — Titrimetric method with potassium dichromate.
ISO 7529: 1989	Nickel alloys — Determination of chromium content — Potentiometric titration method with ammonium iron(II) sulfate.

January 1990 issue of *ISO Bulletin*

TC 28	**Petroleum products and lubricants**
ISO 9162: 1989	Petroleum products — Fuels (class F) – Liquefied petroleum gases — Specifications
TC 91	**Surface active agents**
ISO 6388: 1989	Surface active agents — Determination of flow properties using a rotational viscometer

TC 146	**Air quality**
ISO/TR 4227: 1989	Planning of ambient air quality monitoring
TC 147	**Water quality**
ISO 8692: 1989	Water quality — Fresh water algal growth inhibition test with *Scenedesmus subspicatus* and *Selenastrum capricornum*
ISO 9297: 1989	Water quality — Determination of chloride — Silver nitrate titration with chromate indicator (Mohr's method)
TC 164	**Mechanical testing of metals**
ISO 9513: 1989	Metallic materials — Verification of extensometers used in uniaxial testing
ISO 1355: 1989	Metallic materials — Hardness test — Calibration of standardized blocks to be used for Rockwell superficial hardness testing machines (scales 15N, 30N, 45N, 15T, 30T and 45T)
TC 175	**Fluorspar**
ISO 9438: 1989	Metallurgical-grade fluorspar — Determination of total phosphorus content — Reduced molybdophosphate spectrometric method

February 1990 issue of *ISO Bulletin*

TC 17	**Steel**
ISO 377-1: 1989	Selection and preparation of samples and test pieces of wrought steels — Part 1: Samples and test pieces for mechanical test
ISO 377-2: 1989	Selection and preparation of samples and test pieces of wrought steels — Part 2: Samples for the determination of the chemical composition.
TC21	**Equipment for fire protection and fire fighting**
ISO 5923: 1989	Fire protection — Fire extinguishing media — Carbon dioxide
ISO 7201-1: 1989	Fire protection — Fire extinguishing media — Halogenated hydrocarbons — Part 1: Specifications for halon 1211 and halon 1301
TC 34	**Agricultural food products**
ISO 3656: 1989	Animal and vegetable fats and oils — Determination of ultraviolet absorbance
ISO 7541: 1989	Ground (powdered) paprika — Determination of total natural colouring matter content
TC 45	**Rubber and rubber products**
ISO 5945: 1989	Rubber — Determination of Polyisoprene content
ISO 6179: 1989	Vulcanized rubber sheet, and fabrics coated with vulcanized rubber — Determination of transmission rate of volatile liquids (Gravimetric technique)
TC 61	**Plastics**
ISO 537: 1989	Plastics — Testing with the torsion pendulum
ISO 4585: 1989	Textile glass reinforced plastics — Determination of apparent interlaminar shear properties by short-beam test
ISO 6603-2: 1989	Plastics — Determination of multiaxial impact behaviour of rigid plastics — Part 2: Instrumented puncture test
ISO 8605: 1989	Textile glass reinforced plastics — Sheet moulding compound (SMC) — Basis for a specification
ISO 9396: 1989	Plastics — Phenolic resins — Determination of the gel time at a given temperature using automatic apparatus
ISO 9771: 1989	Plastics — Phenolic resins — Determination of reactivity of resols under acid conditions
TC 102	**Iron ores**
ISO 9517: 1989	Iron ores — Determination of water soluble chloride content — Ion-selective electrode method
TC 146	**Air quality**
ISO 8761: 1989	Work-place air — Determination of mass concentration of nitrogen dioxide — Method using detector tubes for short-term sampling with direct indication
TC 147	**Water quality**
ISO 9698: 1989	Water quality — Determination of tritium activity concentration — Liquid scintillation counting method
TC 175	**Fluorspar**
ISO 9502: 1988	Metallurgical-grade fluorspar — Determination of silica content — Reduced-molybdosilicate spectrometric method

Statistical methods

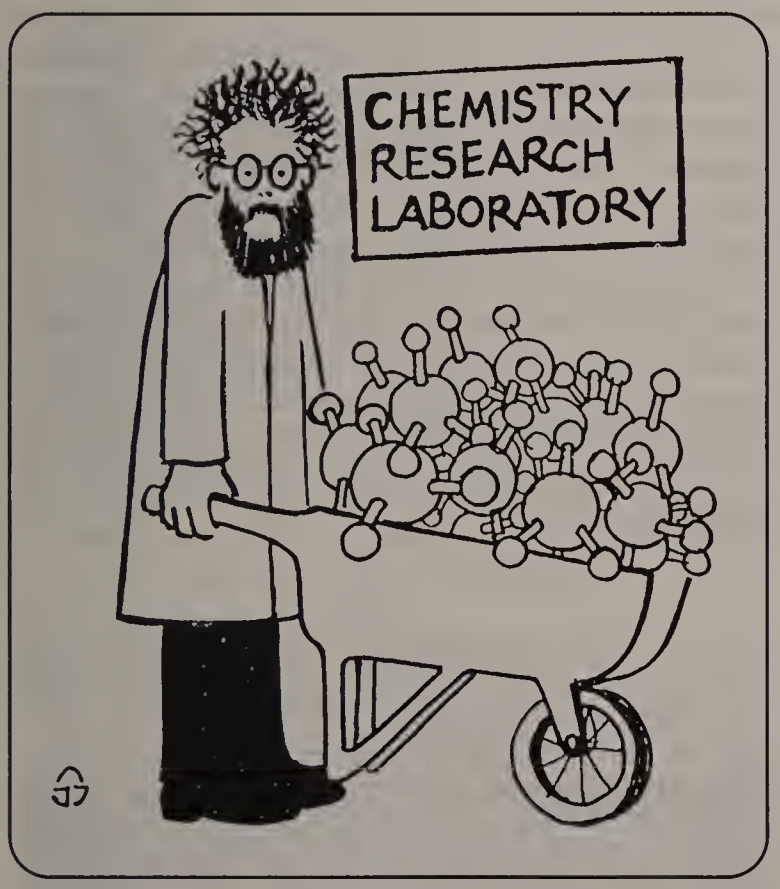
ISO standards handbook 3: Statistical methods is the third edition of this handbook. It is a 470-page compilation of ISO International Standards covering the practical methodology required to process and interpret statistically, test and inspection

results. The book is aimed at statisticians, inspectors, quality assurance experts, and all concerned with scientific sampling and interpretation of statistical data. Separate English and French versions are available.

Copies of ISO standards handbook 3: Statistical methods *(3rd Edn, 1989. ISBN 92-67-10153-6) may be ordered from ISO Central Secretariat, Sales Department, PO Box 56, CH-1211, Geneva 20, Switzerland. Price (IUPAC members only): CHF 90.–.*

Health for all

World Health Statistics Quarterly Vol. 42, No. 4, 1989 published by the World Health Organization in both English and French contains the second report on monitoring progress in the implementation of the 'Global strategy for health for all by the year 2000'. Contents include: Monitoring process and mechanisms; Global socio-economic development trends (1985–88); Health policies and strategies; Development of health systems; International action; Availability of health care; Environmental health; and Health status.



Fifth edition of collaborative study guidelines

Guidelines for the development of standard methods by collaborative study, 5th edition, is the only book of its kind to provide a complete guide to the organization of method-performance interlaboratory studies, the statistical evaluation of results obtained from such studies, and the drafting of the texts of analytical methods standardized by interlaboratory study.

The 5th edition has been specially prepared to incorporate the recommendations outlined in the '1989–IUPAC harmonized protocols for the adoption of standardized analytical methods and for the presentation of their performance characteristics'. These recommendations include the presentation of both general and specific information on analytical quality control to be associated with the texts of standardized methods.

A special feature of the book is a section providing a full coverage of the documentation involved in the development of a standard method by collaborative study — from the initial drafting of letters inviting participation in the study to the final preparation of a report on the outcome of the study.

Guidelines for the development of standard methods by collaborative study, *5th edition, vii + 192 pp. ISBN 0 948926 06 6. Price (incl. p & p) GBP 35.00; for IUPAC members and affiliates: GBP 30.00. Available from W. Dennis Pockington, Laboratory of the Government Chemist, Queens Road, Teddington, Middlesex TW11 0LY, UK.*

Reference materials for marine science

A comprehensive catalogue of reference materials for use in marine chemistry, and marine pollution research and monitoring is available from the National Oceanic and Atmospheric Administration (NOAA), USA. The source, description and preparation, analytes and values, cost, references and comments are given for reference materials in the following categories: ashes, gases, instrument performance, oils, physical properties, rocks, sediments, sludges, tissues, waters.

Copies of the catalogue are available from NOAA: Manager, National Status and Trends Program, NOAA/NOS/OOMA, N/OMA32, Rockville, MD 20852, USA.

Enzyme nomenclature

Supplement 3 (corrections and additions) to Enzyme nomenclature — Recommendations 1984 prepared by the Nomenclature Committee of the International Union of Biochemstry (NC-IUB) has been published (*Eur. J. Biochem.* No. 187, pp. 263–281, 1990).

The document contains 107 entries for new enzymes which have come to light since the finalization of the 1984 edition at the end of November 1983 and the publication of Supplements 1 and 2 (*Eur. J. Biochem.* No. 157, pp. 1–26, 1986; No. 179, pp. 489–533, 1989).

Organometallic chemistry
Detroit, USA
19–24 August 1990

IUPAC SPONSORED

The 14th International Conference on Organometallic Chemistry (XIVth ICOC) will be held from Sunday 19th August to Friday 24 August 1990 on the campus of Wayne State University of Detroit, Michigan, USA.

The scientific programme will include session lectures, contributed papers, poster sessions and the following plenary lectures.

- Stereochemistry and catalysis with zirconium complexes (G. Erker, Würzburg, FRG)
- Theoretical aspects of metal cluster chemistry (M. Mingos, Oxford, UK)
- Pyrolysis of inorganic and organometallic polymers as a route to useful ceramics (D. Seyferth, MIT, USA)
- Main group metallocenes with substituted cyclopentadienyl ligands — from bonding problems to discotic phases (H. Schumann, Berlin, FRG)
- Surface organometallic chemistry: heterogeneous catalysis and self-assembled monolayers, (G. Whitesides, Harvard, USA)

The session topics are: Organometallics in the synthesis of new materials; Main group organometallic compounds; Early transition metal chemistry; Theoretical studies on organometallic compounds.

The registration fees are USD 250 for active participants; USD 125 for students and USD 60 for accompanying persons. Accommodation is available in the Westin Hotel located on the riverfront of downtown Detroit or in dormitory housing at the University of Detroit.

The social programme will include an opening mixer, reception at the Department of Chemistry, Wayne State University and a conference banquet.

Detroit is served by two airports: Detroit Metropolitan/Wayne County Airport and Detroit City Airport. In late August, Detroit is normally sunny and warm, but rain is also possible. Summer clothing plus a light sweater and raincoat should be satisfactory.

Solid sampling
Jülich, FRG
8–10 October 1990

IUPAC SPONSORED

The 4th International Colloquium on Solid Sampling with Optical Atomic Spectroscopy will be held at the Research Centre Jülich. Jülich is a medium sized town near the Dutch and Belgian border of the Federal Republic of Germany.

The colloquium will consist of about seven keynote lectures and approximately 40 original lectures, with plenty of time for discussion. The main topics will be:

- Theory and instrumentation;
- Methodology and procedures;
- Biological and medical applications;
- Food applications;
- Environmental applications;
- Product and quality control; and
- Production and use of certified materials.

The official language of the conference is English. There will be no provision for simultaneous translation.

The registration fees for participants are DEM 330, for affiliates DEM 300 and for students DEM 180. There will be receptions on two evenings of the colloquium.

Access to Jülich for international air travellers is available through Düsseldorf, Cologne, Brussels and Maastricht. There are rail and bus connections between these airports and Aachen. A shuttle bus service will be provided between the hotels in Aachen and the conference centre in Jülich.

The city of Aachen is located in a picturesque valley along the foothills of the Eifel and Ardennes. Aachen's long and turbulent history is closely linked with the name of Charlemagne (Carolus Magnus) who proclaimed the city of the centre of his Frankish empire uniting the Romanic and Germanic people.

Forschungszentrum Jülich GmbH, venue of the 4th International Colloquium on Solid Sampling.

It was the capital of the Holy Roman Empire and for centuries the emperors were crowned here. The most significant monument preserved is the Romanic Cathedral including a treasury. Many interesting shops and cafés are located around the market square.

The climate in Jülich is mild in October, sometimes sunny and with a temperature of 15–20°C.

Clinical chemistry
Barcelona, Spain
9–12 October 1990

IUPAC SPONSORED

The 4th International Congress on Automation and New Technology in the Clinical Laboratory will take place in Barcelona, the 'Palacio de Congresos' from 9 to 12 October 1990.

The aim of the congress is to offer an updated view of the most relevant developments and recent achievements in the field. Moreover, the congress will also hold a wide exhibition of clinical laboratory equipment, where manufacturers and dealers will have facilities for presenting and demonstrating new instruments and new techniques.

The scientific programme will consist of commercial workshops, posters and symposia on the following 16 topics.

1. Robotics.
2. Evaluation of new analytical systems.
3. Spectroscopy.
4. Gene technology
5. Analysis without analysers.
6. Monitoring of proteins.
7. New technology in TDM.
8. Automation in immunoassays.
9. Automation in environmental toxicology.
10. Immunodiagnostics.
11. Advances in separative techniques.
12. Rapid diagnostic procedures in microbiology.
13. Expert systems and chemometrics.
14. Alternative specimens.
15. Biosensors.
16. Flow cytometry.

The lectures and abstracts will be published. The conference language will be English with simultaneous translation into Spanish.

The registration fees will be ESP 25 000 for scientific participants and ESP 12 500 for either students or young chemists. A wide range of accommodation will be available.

Barcelona is a Mediterranean city, enjoying pleasant weather. The average October temperature of 20°C will encourage participants to enjoy evening walks along the harbour and city. The city offers excellent opportunities for sightseeing excursions. A varied programme of social events is planned.

Speciality polymers
Singapore
7–9 November 1990

IUPAC SPONSORED

The IUPAC International Symposium on Speciality Polymers will be held in Singapore, 7–9 November 1990.

Singapore: venue of the International Symposium on Speciality Polymers.

The symposium will consist of plenary lectures, invited lectures, contributed papers and poster sessions covering various aspects of high performance polymers, electro-active polymers and functional polymers.

The plenary/invited lectures include: Prof. T. Saegusa (Kyoto University, Japan); Prof. A. G. MacDiarmid (University of Pennsylvania, USA); Dr R. H. Baughman (Allied Signal Inc., USA); Dr G. Calundann (Hoechst Celanese Corp., USA); Prof. J. C. W. Chien (University of Massachusetts, USA); Prof. M. M. Coleman (Pennsylvania State University, USA); Prof. A. J. Epstein (Ohio State University, USA); Prof. X. D. Feng (Beijing University, China); Dr K. Dhal (Raychem Corp., USA); Prof. J. P. Kennedy (University of Akron, USA); Prof. S. C. Kim (Kaist, Korea); Prof. J. E. McGrath (Virginia Polytechnic Institute and State University, USA); Prof. T. Nishi (Tokyo University, Japan); Prof. J. H. O'Donnell (University of Queensland, Australia); Dr T. H. Spurling (CSIRO, Australia); Dr R. W. Stackman (S. C. Johnson and Son, USA); and Prof. Ph. Teyssie (University of Liege, Belgium).

The official language of the symposium is English and there will be no provision for simultaneous interpretation.

The registration fees are (before/after 1 September): for active participants, USD 295/350; accompanying persons USD 55/80; IUPAC affiliates USD 265/315; students USD 145/160.

The symposium venue is Marina Mandarin, a five-star hotel situated at the harbour front near the city centre. The Marina Mandarin is an integral part of Marina Square with an extensive shopping complex,

set amidst a spacious parkland of trees and gardens. The room charge at Marina Mandarin is about USD 105 inclusive of service charge and tax. Accommodation at other hotels can also be arranged.

Singapore is an island of 625 square kilometres lying just over 1° north of the equator, and is a dynamic, modern metropolis but it has retained many elements of its fascinating past. Its multiracial heritage and history, the wide variety of food and the reputation of being a shoppers' paradise attract more than four miillion visitors annually.

Singapore enjoys a tropical climate, with temperatures ranging from 30°C in the day to 23°C by night. The islands strategic location places it within a short journey of its ASEAN (Association of South East Asian Nations) neighbours which include Malaysia, Indonesia, Brunei, Thailand and the Philippines. Pre- and post-symposium tours to these ASEAN countries can be arranged.

Food contamination — mycotoxins and phycotoxins

Cairo, Egypt
4–15 November 1990

IUPAC SPONSORED

The International Symposium and Workshop on Food Contamination — Mycotoxins and Phycotoxins will be held in Cairo, Egypt from 4 to 15 November 1990.

The interdisciplinary symposium will focus on the development and implementation of effective food safety monitoring programmes. Special emphasis will be given to the areas of mycotoxins and phycotoxins and to concerns of Africa and the Middle East.

The rationale for food contamination monitoring programmes must be based on the significance and incidence of the contamination and the feasibility of removing or reducing risks associated with the hazard. The effectiveness of monitoring programmes is controlled by the availability of information of the identity of the food hazard and the capability to detect and quantify the toxic factors.

Presentations covering the main topics of the programme will be given by leading scientists in the fields of mycotoxin and phycotoxin research, regulation and hazard assessment. The areas of pesticide, industrial chemical and heavy metal contamination of foods will also be discussed.

Participants will be encouraged to discuss problems involving non-microbial contaminants in foods and toxicoses of unknown origin.

The workshop will present hands-on experience in sample collection and preparation, rapid, accurate analytical methods based on immunochemical technology, and food hazard assessment

The Cairo symposium will include lectures on 'Assessment of human exposure to chemical contaminants in foods' and 'Handling toxicoses of unknown origin'. *(Photo by G. De Sabatino courtesy FAO.)*

techniques. Background information gained from the symposium and practical experience from the workshop will qualify participants to assess and/or establish effective food contamination monitoring programmes for their countries.

The scientific programme of the symposium will include plenary lectures and poster sessions on the following main topics.

1. Assessing risks from food with non-microbial contamination.
2. Current topics in mycotoxins.
3. Current topics on phycotoxins.
4. Current topics in pesticides, heavy metals and industrial chemical contaminants.
5. Food contamination monitoring progammes.

The workshops will focus on the following topics.

- Sampling
- Quality assurance
- Immunoassay methods
- Practical methods in mycotoxin analysis
- Toxicity screening techniques

The symposium will be held at the Egyptian International Centre for Agriculture, Dokki, Cairo and the workshop at the National Research Centre, Dokki.

Latin American chemistry congress

Buenos Aires, Argentina
5–9 November 1990

IUPAC SPONSORED

The 19th Latin American Chemistry Congress will be held in Buenos Aires, 5–9 November 1990. The meeting aims to gather together chemists from Latin American countries to enable them to inform each other about their respective research subjects, attend plenary and session lectures and participate in the scheduled congress activities.

The scientific programme of the congress will consist of 16 sections.

1. Inorganic, bio-inorganic and radiochemistry.
2. Analytical chemistry.
3. Organic chemistry.
4. Physical chemistry.
5. Bio-organic chemistry including natural products.
6. Chemistry of macromolecules.
7. Food chemistry.
8. Industrial chemistry.
9. Biochemistry and biotechnology.
10. Chemical energetics.
11. Electrochemistry and corrosion.
12. Environmental chemistry.
13. Toxicology and forensic chemistry.
14. Informatics applied to chemistry.
15. Chemical education.
16. Theoretical chemistry.

The following eminent scientists have agreed to present plenary lectures at the congress: Prof. Duilio Arigoni (Zürich, Switzerland); Prof. Derek Barton (Texas, USA); Prof. James Black (London, UK); Dr Enrico Clementi (New York, USA); Prof. Alois Haas (Bochum, FRG); Prof. Hartmut Michel (Frankfurt, FRG); Prof. Dietmar Seyferth (Massachusetts, USA); Prof. Gabor Somorjai (Berkeley, USA).

Formulation physical chemistry
Toulouse, France
17–19 October 1990

Formula II — the 2nd International Forum on Formulation Physical Chemistry and Applications — will be held at the Palais des Congrès, Toulouse, France, 17–19 October 1990. Five sessions are planned:

1. Formulation and surface state;
2. Reactivity and formulation;
3. Quality, security and environment;
4. Instrumentation, analysis and formulation; and
5. Teaching the science of formulation.

For further information contact: Société Française de Chimie, Département Congrès, 250 rue Saint-Jacques, 75005 Paris, France. Tel: +33 (10) 43 25 20 778. Fax: +33 (1) 40 46 83 80.

Conference Calendar

Conference circulars and registration forms for the IUPAC-sponsored conferences listed below may be obtained, upon request, from the names and addresses shown in brackets.

1990

Macromolecules

8–13 July. 33rd International Symposium on Macromolecules. Montreal, Canada.
(IUPAC MACRO 90 Secretariat, Dept. of Chem. Engineering, McGill University, 3480 University Street, Montréal, Québec, Canada H3A 2A7. Tel. +1 (514) 3987487. Fax. +1 (514) 398678.)

Mechanisms of polymer strength and toughness

16–19 July. 13th Discussion Conference on Macromolecules Mechanisms of Polymer Strength and Toughness. Prague, Czechoslovakia.
(PMM Secretariat, c/o Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 162 06 Prague, Czechoslovakia. Tel. +42 (2) 360345 Fax. +42 (2) 367981. Cable MACRO PRAGUE. Telex 122019 IMCP C.)

Photochemistry

22–28 July. 13th IUPAC International Symposium on Photochemistry. Warwick, UK.
(Dr J. F. Gibson, 13th IUPAC Symposium on Photochemistry, Royal Society of Chemistry, Burlington House, London W1V 0BN. Tel. +44 (1) 7349864. Fax. +44 (1) 4378883.)

Polymer analysis and characterization

23–25 July. 3rd International Symposium on Polymer Analysis and Characterization. Brno, Czechoslovakia.
(Dr Howard G. Barth, Du Pont Company, Experimental Station, Wilmington, Delaware 19898, USA. Tel. +1 (302) 6954354.)

Organic synthesis

23–27 July. 8th International Conference on Organic Synthesis. Helsinki, Finland.
(8th IUPAC Conference on Organic Synthesis, PO Box 722, SF-00101 Helsinki, Finland. Fax. +358 (0) 611188.)

Boron chemistry

30 July–3 August. 7th International Meeting on Boron Chemistry — IMEBORON VII. Torun, Poland.
(Dr J. K. Ruminski, IMEBORON

VII Secretary, Institute of Chemistry, Nicolaus Copernicus University, 7 Gagarin Street, 87-100 Torun, Poland.)

Solubility phenomena

1–3 August. 4th International Symposium on Solubility Phenomena. Troy, New York, USA.
(Dr Mark Salomon, Co-Chairman, 4th International Symposium on Solubility Phenomena, PO Box 254, Fair Haven, NJ 07704, USA.)

Solution chemistry

5–10 August. 11th International Conference on Solution Chemistry. Ottawa, Canada.
(The Secretariat, XXI ICSC, Faculty of Science, University of Ottawa, Ottawa, Ontario, Canada K1N 6N5. Tel. +1 (613) 5642430. Fax. +1 (613) 5645014.)

Pesticide chemistry

5–11 August. 7th International Congress of Pesticide Chemistry. Hamburg, Federal Republic of Germany.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D–6000 Frankfurt/Main 90, Federal Republic of Germany. Tel. +49 (69) 7917360 or +49 (69) 7917365. Fax. +49 (69) 7917322 and 7917475.)

Physical organic chemistry

6–10 August. 10th International Conference of Physical Organic Chemistry. Haifa, Israel.
(Prof. Yitzhak Apeloig, Department of Chemistry, Technion-Israel Institute of Technology, Haifa, 32000, Israel. Tel. +972 (4) 293111. Telex 46406.)

Carbohydrates

12–17 August. 15th International Carbohydrates Symposium. Yokohama, Japan.
(Prof. Yoshiharu Ishido, General Secretary, 15th International Carbohydrate Symposium, c/o Department of Chemistry, Faculty of Science, Tokyo-Institute of Technology, O-okayama, Meguro-ku, Tokyo 152, Japan.)

Raman spectroscopy

13–17 August. 12th International Conference on Raman Spectroscopy. Columbia, South Carolina, USA.
(Prof. J. R. Durig, College of Science and Mathematics, University of South Carolina, Columbia, South Carolina 29208–0001, USA. Tel. +1 (803) 7772505. Fax. +1 (803) 7773065. Telex 573414 UNIVSCAROL.)

Co-ordination chemistry

13–18 August. 28th International Conference on Co-ordination Chemistry. Gera, GDR.
(Dr D. Walther, Sektion Chemie der Friedrich-Schiller-Universität. Steiger 3, Haus 111, Jena 6900, German Democratic Republic.)

Organometallic chemistry

19–24 August. 14th International Conference on Organometallic Chemistry. Detroit, Michigan, USA.
(Prof. John P. Oliver, The Secretariat, 14th International Conference on Organometallic Chemistry, 135 Chemistry Building, Wayne State University, Detroit, MI 48202, USA.)

Chemical thermodynamics

26–31 August. 11th IUPAC Conference on Chemical Thermodynamics. Como, Italy.
(11th IUPAC Conference on Chemical Thermodynamics, c/o Dip. to Chimica Fisica Applicata, Politecnico di Milano, Via Golgi, 39, 20133 Milano MI, Italy. Tel. + 39 (2) 2363770/2664317/2364522. Fax. +39 (2) 2664950.)

Medicinal chemistry

2–7 September. 11th International Conference on Medicinal Chemistry. Jerusalem, Israel.
(Prof. Raphael Mechoulam, Department of Natural Products, School of Pharmacy, Hebrew University, Jerusalem, 91904, Israel.)

Organic chemistry of sulfur

2–7 September. 14th International Symposium on the Organic Chemistry of Sulfur. Lodz, Poland.
(Prof. M. Mikolajczyk, Centre of

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy.

IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than 3 months in advance. If a visa is not granted 1 month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

In the case of the 32nd IUPAC Congress (Stockholm, Sweden: 2–7 August 1989), it was observed that the time for treating visa applications in Sweden, may be as long as 5–6 weeks. To this must be added the time for handling the applications at the Swedish Embassy in the various countries of the intending participants. This confirms the need for applications to be made not less than 3 months in advance.

Molecular and Macromolecular Studies, Polish Academy of Sciences, Sienkiewicza 112, 90-363 Lodz, Poland.)

Polymerization reactions

9–13 September. International Symposium on Mechanisms and Kinetics of Polymerization Reactions: Their Use in Polymer Synthesis. Paris, France.
(SYMPOL 90 — Secretariat, Laboratoire de Chimie Macromoléculaire, Université Pierre et Marie Curie — Tour 54 — 4e étage, 4 Place Jussieu, 75252 Paris Cédex 05, France. Tel. +33 (1) 43362525 ext. 5541. Fax. +33 (1) 43544097. Telex UPMC SIX 200 145 F.)

Safety in chemical production

10–13 September. 1st IUPAC Workshop on Safety in Chemical Production. Basel, Switzerland.
(This workshop is not open for general participation but restricted to a limited number of invited participants.)

Solid sampling with optical atomic spectroscopy

8–10 October. 4th International Colloquium on Solid Sampling with Optical Atomic Spectroscopy. Jülich, Federal Republic of Germany.
(Dr J. Pauwels, c/o Central Bureau for Nuclear Measurements, Steenweg naar Retie, B 2440 Geel, Belgium.) Amsterdam, The Netherlands.)

Automation and new technology in the clinical laboratory

9–12 October. 4th International Congress on Automation and New Technology in the Clinical Laboratory. Barcelona, Spain.
(Dr Roman Galimany, Seccion Automatizacion. Servicio de Bioquimica, Residencia Sanitaria Germans Trias i Pujol, Carretera Canyet s/n. 08916 Barcelona, Spain.)

Mycotoxins and phycotoxins

4–15 November. International Symposium and Workshop on Mycotoxins and Phycotoxins. Cairo, Egypt.
(Professor Khayria Naguib, National Research Centre, Dokki, Cairo, Arab Republic of Egypt.)

How to apply for IUPAC sponsorship

To apply for IUPAC sponsorship, conference organizers should write to the IUPAC Secretariat (see inside back cover for address) requesting an Advanced Information Questionnaire (AIQ). Completed AIQs should be returned to the Secretariat preferably **2 YEARS** and at least 12 months before the conference. Late applications will not be considered. Further information on granting of IUPAC sponsorship was published in *CI*, Vol. 11, No. 1, pp. 4–5, 1989.

19th Latin American chemistry congress

5–9 November. 19th Latin American Chemistry Congress. Buenos Aires, Argentina.
(XIX Congreso Lationamericano de Química, Seccion Comunicaciones, Sánchez de Bustamante 1749, (1425) Buenos Aires, Argentina.)

Speciality polymers

7–9 November. International Symposium on Speciality Polymers. Singapore.
(Secretary, IUPAC Symposium Organizing Committee, c/o Department of Chemistry, National University of Singapore, Singapore 0511, Republic of Singapore. Fax. 010 +65 7791691.)

1991

Polymer materials

10–15 February. Polymer 91: International Symposium on Polymer Materials: Preparation, Characterization and Properties. Melbourne, Australia.
(Polymer 91 Secretary, PO Box 224, Belmont, Victoria 3216, Australia. Fax. +61 (52) 472657.)

Organic chemistry: technological perspectives

15–19 April. 2nd International Symposium "Organic Chemistry: Technological Perspectives". Baden-Baden, Federal Republic of Germany.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D–6000 Frankfurt/Main 90, FRG.

Spectroscopy

9–14 June. 17th Colloquium Spectroscopicum Internationale. Bergen, Norway.
(17th Colloquium Spectroscopicum Internationale, HSD Congress – Conference, PO Box 1721 Nordnes, N. 5024 Bergen, Norway.)

Surface and colloid science

7–12 July. 7th International Conference on Surface and Colloid Science. Compiegne, France.
(Prof. M. Clausse, Université de Technologie de Compiégne, B.P. 649, F-60206 Compiégne Cédex, France.)

Rheology of polymer melts

15–19 July. 14th Discussion Conference on Macromolecules Rheology of Polymer Melts. Prague, Czechoslovakia.
(Dr P. Čefelín, Deputy Director, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovského n. 2, 162 06 Prague 6-Petřiny, Czechoslovakia. Tel. + 42 (2) 360317). Telex 122019 IMCP C.)

IUPAC congress

17–22 August. 33rd IUPAC Congress, Budapest, Hungary. (33rd IUPAC Congress, Prof. E. Pungor, c/o Hungarian Academy of Sciences, H-1111 Budapest, Gellért tér 4, Hungary. Tel. + 36 (1) 664 705. Fax. +36 (1) 851 477. Telex 225931 MUEGY H.)

Organometallic chemistry

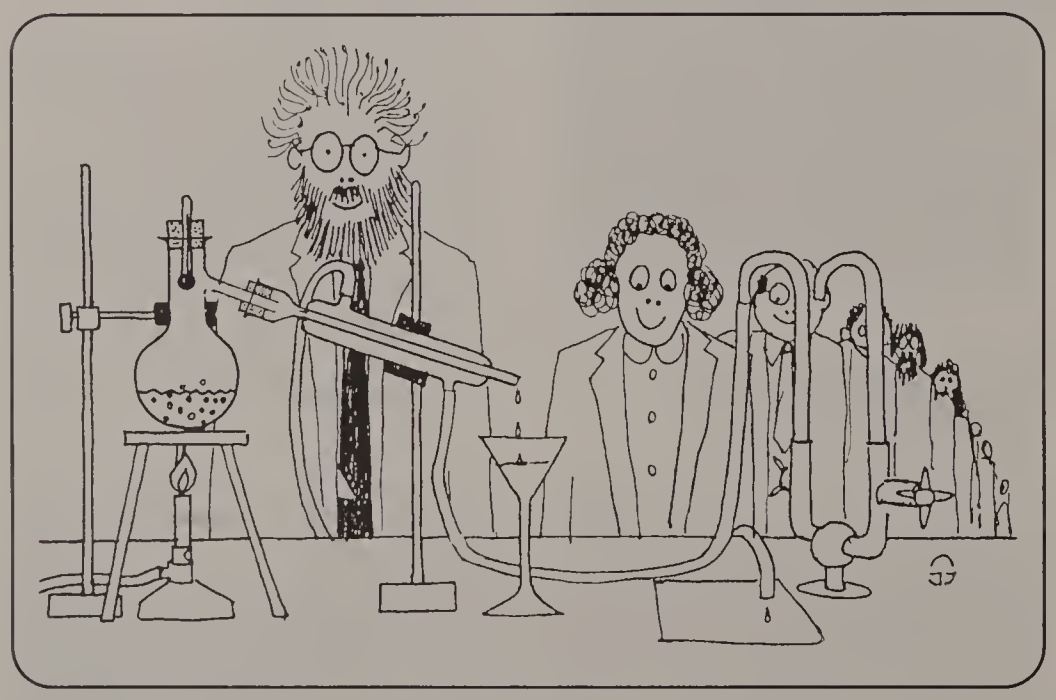
25–29 August. 6th International Symposium on Organometallic Chemistry Directed Toward Organic Synthesis (OMCOS). Utrecht, The Netherlands.
(Symposium Secretariat OMCOS 6, Congress Bureau, Royal Dutch Industries Fair, PO Box 8500, 3503 RM UTRECHT, The Netherlands.)

Macromolecule–metal complexes

30 September–5 October. 4th International Symposium on Macromolecule–Metal Complexes. Siena, Italy.
(Prof. R. Barbucci, Dipartimento di Chimica, Università di Siena, Piano dei Mantellini 44, 53100 Siena, Italy. I-56100 Pisa, Italy.)

CHEMRAWN VII

2–6 December. World Conference on Chemistry of the Atmosphere: Its Impact on Global Change. Baltimore, Maryland, USA.
(Prof. Robert Sievers, Director of CIRES, Campus Box 216, University of Colorado, Boulder, CO 80309-0216, USA.)



1992

Ring opening polymerization

7–12 July. International Symposium on Ring Opening Polymerization. Warsaw, Poland.
(Prof. Zbigniew J. Jedlinski, Institute of Polymer Chemistry, Polish Academy of Sciences, 34 M. Curie-Sklodowska., 41-300 Zabrze, Poland.)

Risk management of chemicals

13–16 July. International Symposium on Risk Management of Chemicals. Can Chemicals be Used Safely? Guildford, UK.
(Dr J. F. Gibson, Secretary (Scientific), The Royal Society of Chemistry, Burlington House, London W1V 0BN, UK.)

Macromolecules

13–18 July. 34th International Symposium on Macromolecules. Prague, Czechoslovakia.
(Dr P. Čefelin, Deputy Director, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovského n. 2, 162 06 Prague 6-Petřiny, Czechoslovakia. Tel. + 42 (2) 360317. Telex 122019 IMCP C.)

Natural products

30 August–4 September. 18th International Symposium on Natural Products. Strasbourg, France. (Prof. G. Ourisson, Centre de Neurochimie, 5 rue Blaise Pascal, F-67084 Strasbourg, France.)

Analytical sciences

25–31 August. International Congress on Analytical Sciences. Chiba, Japan.
(ICAS '91 Secretariat, The Japan Society for Analytical Chemistry, 1-26-2, Nishigotanda, Shinagawa, Tokyo 141, Japan.)

New polymers

30 November–1 December. International Symposium on New Polymers. Kyoto, Japan.
(Prof. Toshinobu Higashiura, Department of Polymer Chemistry, Kyoto University, Yoshida, Sakyo-ku, Kyoto 606, Japan.)

Analytical chemistry

20–26 September. SAC 92: International Conference on Analytical Chemistry. Reading, UK.
(Dr J. D. R. Thomas, School of Chemistry, University of Wales College of Cardiff, PO Box 912, Cardiff CF1 3TB, UK.)

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Automation and New Technology in the Clinical Laboratory
KIYOSHI OKUDA

Much of the recent progress in medical science and medical care can be attributed to developments in laboratory medicine. Usually, an advance in methodology leads to developments in the field of science; past innovations in laboratory medicine have always been supported by improvements in methodology achieved through the active introduction, understanding and application of technology from chemistry, physics, biology, and related fields. For the future development of laboratory medicine, continued close interaction with the new technologies of these related fields is essential.

This volume reports the proceedings of the 3rd International Congress on Automation and New Technology in the Clinical Laboratory held at Kobe, Japan, 5-8th September, 1989. These published proceedings, from an international group of experts, cover the very latest developments in research on automation in the clinical laboratory including the theory and practical applications of the latest technology.

1990. 318 pages, 182 illustrations.
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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries;
- to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;
- to co-operate with other international organizations which deal with topics of a chemical nature;
- to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 45 countries, each represented by a national organization, such as an academy of science or research council.

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Chemistry International

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Front cover: Melbourne, Australia, venue of the forthcoming IUPAC-sponsored International Symposium on Polymer Materials: Preparation, Characterization and Properties.

International Union of Pure and Applied Chemistry

Free circulation of scientists

The International Council of Scientific Unions (ICSU) is the oldest existing non-governmental body committed to international scientific co-operation for the benefit of humanity.

Created in 1931 after its predecessor, the International Research Council, was dissolved because of discrimination against scientists of certain countries, ICSU has been vigorously pursuing a policy of non-discrimination ever since. ICSU maintains that discrimination hinders the free communication and exchange of ideas and information among scientists and thereby blocks the progress of science, which depends on their collective efforts.

ICSU's members are 20 international scientific unions (including IUPAC) and 76 national academies of science or research councils. Together these set up international mechanisms to carry our scientific programmes of an interdisciplinary nature.

An important factor in the success of these activities, which are concerned with issues such as the protection of the environment, Antarctic regions or space research, is that they are carried out under the aegis of a respected independent and international scientific body such as ICSU.

Each member adheres to the Council's statutes when involved in activities carried out within ICSU's framework. One of the basic principles in these statutes is that of non-discrimination, which affirms the right and freedom of scientists to associate in international scientific activity without regard to such factors as citizenship, religion, creed, political stance, ethnic origin, race, colour, language, age or sex. All of these rights are embodied in a variety of articles in the *International Bill of Human Rights*.

ICSU seeks to protect, and promote awareness of, the rights and fundamental freedoms of scientists in their scientific pursuits. ICSU has a well-established non-political tradition which is central to its character and operations and it does not permit any of its activities to be disturbed by statements or actions of a political nature.

As the intrinsic nature of science is universal, its success depends on co-operation, interaction and exchange, much of which goes beyond national boundaries. In order to achieve its objectives, scientists involved in ICSU activities must therefore be able to have free access to each other and to scientific data and information. It is only through such access that science can produce its fruits and international scientific co-operation can flourish.

ICSU members – including IUPAC – affirm the right and freedom of scientists to associate in international scientific activity without regard to such factors as citizenship, religion, creed, political stance, ethnic origin, race, colour, language, age or sex. ***(Photo courtesy Lilly Industries Ltd.)***

'As the intrinsic nature of science is universal, its success depends on co-operation, interaction and exchange, much of which goes beyond national boundaries.'

ICSU recognizes that scientists are not working in a world where such open access is always assured and it uses its best endeavours privately to resolve difficulties where they arise. In most cases it has been successful. Where such consultations have failed ICSU has, however, had to publicize acts of discrimination against scientists and take steps to prevent their repetition, even to the extent of encouraging members of the ICSU family to decline invitations to hold meetings in the country concerned. On the basis of its firm and unwavering commitment to the principle of the free circulation of scientists ICSU continues to oppose any tendency to weaken or undermine this principle.

The above 'ICSU Statement on Free Circulation of Scientists' was published in the January 1990 issue of the ICSU Newsletter Science International *(No. 39, p. 2). For further information about ICSU, its activities and its publications, contact: ICSU Secretariat, 51 Boulevard de Montmorency, F-75016 Paris, France. Tel: +33 (1) 45 25 03 29. Fax: + 33 (1) 42 88 94 31. Telex: 630553 F.*

The New International Temperature Scale of 1990, ITS–90

A new internationally agreed temperature scale, to be known as ITS–90, was formally agreed by the Comite International des Poids et Mesures (CIPM) in September 1989.

The changes will be important to anyone concerned with temperature measurement or control to a precision of 0.1°C or better. However, neither the definition of thermodynamic temperature nor the definition of the kelvin or the Celsius temperature scales has changed; it is the way in which we are to *realize* these definitions that has changed. The changes are outlined briefly below, but further information — including a four page A4 information sheet — can be obtained from Dr R. L. Rusby of the Division of Quantum Metrology at the National Physical Laboratory, Teddington TW11 0LW, UK.

The ultimate definition of thermodynamic temperature is in terms of pV (pressure x volume) in a gas thermometer extrapolated to low pressure. The kelvin (K), the unit of thermodynamic temperature, is defined by specifying the temperature of one fixed point on the scale: this is chosen as the triple point of water which is defined to be 273.16 K. The Celsius temperature scale (°C) is defined by the equation $T_k/°C = T_\alpha/K - 273.15$, where the freezing point of water at 1 atm is 273.15 K. However, in practice temperature measurements are made using more practical devices such as a platinum resistance thermometer, calibrated using a series of fixed points such as the freezing point of tin. The platinum resistance thermometer becomes an interpolation device, and the fixed points are secondary standards determined by such bodies as the National Physical Laboratory in terms of the ultimate definitions.

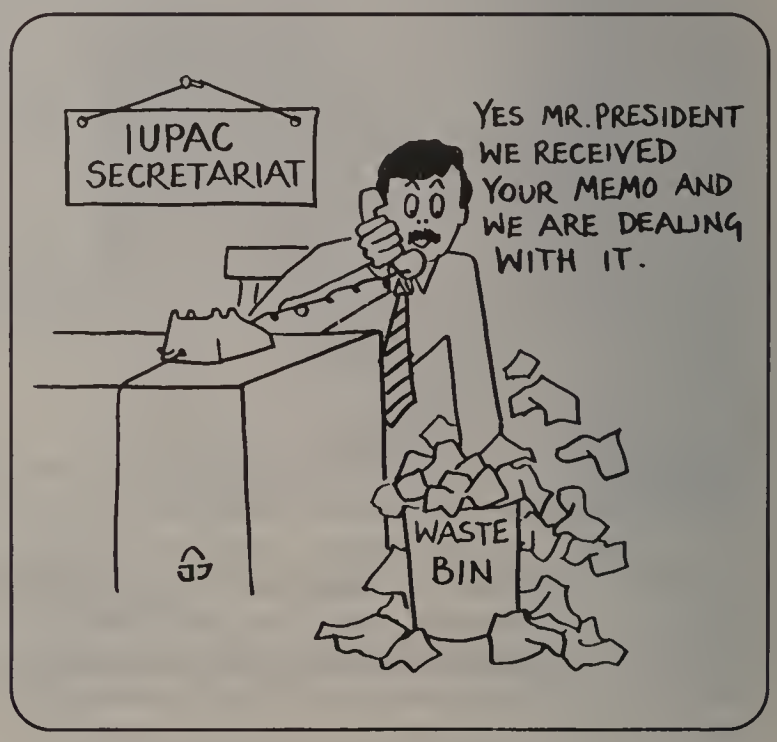
The changes concern the recommended thermometers to be used in different regions of the temperature scale, and the list of secondary standard fixed points. The new list of fixed points is given in the Table below. Platinum resistance thermometers are recommended for use between 14 K and 1235 K (the freezing point of silver), calibrated against the fixed points according to a specified procedure. Below 14 K either the vapour pressure of helium or a constant-volume gas thermometer is to be used, and above 1235 K radiometry is used in conjunction with the Planck radiation law.

The changes in temperature determined using ITS-90 from the previous standard IPTS-68 (adopted in 1968) are always less than 0.4 K, and almost always less than 0.2 K, in the range 0–1300 K.

I. M. Mills (Secretary, Commission I.1)
M. B. Ewing (Commission I.2)

Table. Fixed points in the ITS-90

Fixed points	T_{90}/K	t_{90}/°C
Triple point of hydrogen	13.8033	−259.3467
Boiling point of hydrogen at 33321.3 Pa	17.035	−256.115
Boiling point of hydrogen at 101292 PA	20.27	−252.88
Triple point of neon	24.5561	−248.5939
Triple point of oxygen	54.3584	−218.7916
Triple point of argon	83.8058	−189.3442
Triple point of mercury	234.3156	−38.8344
Triple point of water	273.16	0.01
Melting point of gallium	302.9146	29.7646
Freezing point of indium	429.7458	156.5985
Freezing point of tin	505.078	231.928
Freezing point of zinc	692.677	419.527
Freezing point of aluminium	933.473	660.323
Freezing point of silver	1234.93	961.78
Freezing point of gold	1337.33	1064.18
Freezing point of copper	1357.77	1084.62



Author deadlines for *CI* 1991

The following are the deadlines for receipt of items at the IUPAC Secretariat in Oxford for publication in 1991 issues of *CI*. Authors of feature articles and other lengthy items should submit their contributions well in advance of these dates. Since *CI* is a news magazine it is not possible to guarantee publication of any item in a particular issue. In many cases it is necessary to postpone publication of material to a later issue.

CI Vol. 13, 1991 issue number		Deadline for receipt of material
1	(January)	90.09.28
2	(March)	90.11.23
3	(May)	91.02.01
4	(July)	91.03.29
5	(September)	91.06.07
6	(November)	91.08.02

Please note that the International Organization for Standardization (ISO) agreed format for writing dates is used as follows: year.month.day.

Free copies of booklet available to affiliates

Copies of the 64-page illustrated book on *The IUPAC programme on chemistry and the environment* have been distributed to members of IUPAC commissions and committees, national adhering organizations and other bodies associated with IUPAC.

A limited number of free copies are available to IUPAC affiliates who have completed and returned their yellow 1990 registration forms to the IUPAC Secretariat.

To apply for a copy, please write to the Affiliate Affairs Secretary at the IUPAC Secretariat.

Names and addresses

Full details (names, addresses, telephone/telex/fax numbers) of all commission and committee chairpersons and secretaries and IUPAC officers were published in the November 1989 issue of *CI* (Vol. 11, No. 6, pp. 225–235). The IUPAC Secretariat has been notified of the following additions and changes:

Prof. J. R. De Laeter (Chairman, Commission on Atomic Weights and Isotopic Abundances). School of Physical Sciences, Curtin University of Technology, GPO Box U 19897, Perth, Western Australia 6001, Australia. Tel: +61 (9) 351 7093. Fax: +61 (9) 351 2682.

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Prof. C. G. Wermuth (President, Section on Medicinal Chemistry). Tel: +33 88 67 37 22.

Errata

On page 87 of the May 1990 issue of *CI* we reported that Mr E. W. Godly is Secretary of the Commission on Nomenclature of Inorganic Chemistry. He is, in fact, Secretary of the Commission on Nomenclature of Organic Chemistry. We apologize to Mr Godly for this error.

The caption under the photograph of Prof. K. I. Zamaraev on page 12 of the January 1990 issue of *CI* erroneously stated that he became President of the Physical Chemistry Division at Lund. In fact, Prof. G. M. Schneider became President of the Division at Lund. Prof. Zamaraev was President of the Division from 1987 to 1989 and at Lund became a member of the Bureau. He is also a co-opted member of Physical Chemistry Division Committee.

Eukaryotic nomenclature

A document entitled 'Nomenclature of initiation, elongation and termination factors for translation in eukaryotes: recommendations 1988' prepared by the Nomenclature Committee of the International Union of Biochemistry has been published in the *European Journal of Biochemistry* (Vol. 186, pp. 1–3, 1989).

Profile of the Italian Chemical Society

The IUPAC affiliate membership programme in Italy is operated by the Italian Chemical Society. Last year was the 70th anniversary of the founding of the Society.

The Italian Chemical Society was founded in 1909. In 1988 it had about 4080 members. The only specific requirement for membership is an interest in chemistry. Applications are examined and approved by the boards of the local sections.

A maximum of 20 honorary members, of which at most five may be Italian, can be designated by the Central Council. Companies, institutions and schools may become collective members.

According to the statutes, the purpose of the Society is to promote the study and progress of chemistry and its applications and in particular to encourage research in all fields of chemistry. It also aims to publicize the importance of chemistry and chemical industry for the prosperity and progress of the country, to establish and maintain relations with sister organizations in other countries and to promote the study of chemistry at all levels of the education system.

Organization

The Society is governed by its Central Council, consisting of the president, the immediate past-president, two elected vice-presidents and the presidents of the local (regional) sections. The Central Council meets twice a year. The Executive Committee (president, past-president, vice-presidents) assists the president in running the Society.

The General Assembly of members, which is the highest deliberating body of the Society, meets once a year. Every 3 years it designates two candidates for president and four for vice-president. The actual election takes place by mail poll. Local sections and divisions similarly elect their councils.

The Secretariat of the Society is located in Rome and at present has six employees. It handles all matters concerning membership, local sections and divisions, relations with government offices, and other national and foreign scientific and technical associations. It also handles all matters concerning the publications of the journals, subscriptions and so on.

IUPAC affiliate membership in Italy is operated through the Secretariat in Rome. The number of Italian affiliates this year (1990) is 184.

The Society is organized into 17 local sections that operate on a regional basis in nine divisions: analytical; chemical education; electrochemistry; industrial; inorganic; mass spectrometry; organic; pharmaceutical chemistry; and physical chemistry. There are also the following specialized inter-

The Secretariat of the Italian Chemical Society is located in Rome.

One of the meeting rooms at the Secretariat.

divisional groups: catalysis; food chemistry; carbohydrate chemistry; computational chemistry; chemistry of biological systems and processes; environmental chemistry; colloid and interphases; photochemistry; radiochemistry; magnetic resonances; safety in the chemical environment; and thermodynamics of complexes.

Activities

The Society organizes several meetings or symposia each year, the main event being the National Congress held every third year. Local sections organize, according to their size, from two to ten events per year. Every year, each division or group holds a divisional meeting. This includes business and scientific sessions. Other events such as specialized symposia, permanent education courses and lectures are also held.

The Society has no specific professional activity programme. However, it looks after public relations and co-operates with professional bodies (Collegio Nazionale dei Chimici; Ordini Regionali dei Chimici; Unione Nazionale Chimici Italiani) in publicizing the role and improving the public image of chemistry.

Activities of the Society are financed by membership fees, subscriptions to journals, and government grants. Some activities, such as congresses and meetings, receive support from local organizations and industry.

Journals

The Society publishes the following journals:

- *Gazzetta Chimica Italiana*: a scientific journal founded in 1870 by S. Cannizzaro. The journal publishes research papers in all fields of fundamental chemistry.
- *Annali di Chimica*: a scientific journal founded in 1914. This publishes research papers in analytical and applied chemistry.
- *Il Farmaco*: a scientific journal founded in 1945 which publishes research papers in the field of pharmaceutical and medicinal chemistry.

Two other journals are owned by Editrice di Chimica, a company in which the Italian Chemical Society is the majority shareholder. These journals are published under the scientific direction of the Society.

- *La Chimica e l'Industria* publishes technical information and reports on all activities of the Society as well as research papers in industrial chemistry and chemical engineering and reviews in all fields of chemistry. It is the official journal of the Society, mailed to all members.
- *La Chimica nella Scuola* publishes papers dealing with all aspects of education in chemistry, from elementary school to university.

The Society has a small library and a distribution service for educational material such as audio-visual aids and software. The Society adheres to COASSI, a committee which co-ordinates the activities of national scientific associations and deals with governmental authorities for all matters of common interest.

The Society is an active member of the Federation of European Chemical Societies (FECS), the European Economic Community (EEC) Chemistry Committee and other international scientific organizations.

The address of the Italian Chemical Society is: Societa Chimica Italiana, Viale Liegi, 48 — 00198 Roma, Italy. Tel: +39 (6) 85 96 91.

From left: Prof Giancarlo Jommi, President (1987–9); Prof Gianfranco Scorrano, President (1990–2); Signora Fausta Veneroni, Membership Secretary at the Secretariat.

Nomenclature of inorganic chemistry

Jeff Leigh

The new edition of *Nomenclature of inorganic chemistry: Recommendations 1990* (the Red Book) issued by the IUPAC Commission on the Nomenclature of Inorganic Chemistry was published in February this year. Editor Jeff Leigh explains the background to this new edition and outlines the contents.

Introduction

The new edition of *Nomenclature of inorganic chemistry* (the Red Book) was published in February 1990. This bald statement hides the fact that it represents the culmination of the endeavour and enthusiasm of an enormous number of people of many different disciplines and languages over a period of 15 years.

The book has involved a consultation process of enormous extent, and an effort to create a new kind of approach to inorganic nomenclature. For some of those involved, this book represents the fruition of considerably more than casual and occasional indulgencies in the pastime of inorganic nomenclature, but rather the culmination of the work of many years.

The first edition of the Red Book was published in 1959, in a two-language edition, English and French. This was actually a revised version of the '1940 Rules', whose diffusion and adoption were undoubtedly hindered by the Second World War. This edition totalled about 90 pages, or about 45 pages per language. The second edition, the '1970 Rules', was published in one language, English, in 1971. Now occupying 110 pages, it was essentially an expanded and revised version of the first edition.

Of course, inorganic chemistry, and particularly the chemistry of complexes, both inorganic and organometallic, has expanded tremendously within the last 20 years, not only in terms of the number of compounds known but also in terms of new kinds of compound, the names for which are increasingly difficult to develop using the principles presented in the 1970 Rules.

Editor Jeff Leigh: 'for some of those involved, this book represents the fruition of considerably more than casual and occasional indulgencies in the pastime of inorganic nomenclature, but rather the culmination of the work of many years.'

The Commission for the Nomenclature of Inorganic Chemistry (CNIC) therefore decided that the new edition would not be a revision but a completely new account which would subsume most of the earlier material. This is not a third edition, but a new version altogether. Furthermore, rather than write the new edition as a set of formal rules, which would be too difficult to draft in a completely satisfying and logical way, it was decided to produce a series of recommendations copiously illustrated with examples, which would explain the principles employed at any and every stage.

The new Red Book comprises 11 chapters and 289 pages. It is in a form making it easy to use as a reference book, to dip into it and obtain information quickly, or to read around a topic at length. There are copious cross-references, particularly to the 1979 edition of the Blue Book: *Nomenclature of organic chemistry*.

Innovative

Above all, this new edition is innovative. Chapter 1 provides an introduction to nomenclature and nomenclature systems. The emphasis throughout the book is on coordination nomenclature. It explains what coordination nomenclature is, and how it differs from 'organic' systems such as substitutive nomenclature. Chapter 2 is a summary of inorganic nomenclature usages: for example, it lists all the usages of arabic numerals (see Extract 1), hyphens, and semi-colons in nomenclature. The book attempts to cover every standard nomenclature device. This second chapter should be of tremendous value to users.

An attempt has been made to present the material in subsequent chapters in some logical order. Chapter 3 describes the names of elements or atoms. Initially, there were philosophical problems since some languages other than English preserve a very clear distinction between the two. Nevertheless, these essentially trivial names are the bases of inorganic nomenclature.

The Red Book has 11 chapters

1. General aims, functions, and methods of chemical nomenclature
2. Grammar
3. Elements, atoms and groups of atoms
4. Formulae
5. Names based on stoichiometry
6. Solids
7. Neutral molecular compounds
8. Names for ions, substituent groups and radicals, and salts
9. Oxoacids and derived anions
10. Coordination compounds
11. Boron hydrides and related compounds

In this chapter (3) are presented the (contentious) IUPAC Periodic Table Group numbering, the names for the elements with atomic numbers greater than 103, the name hydron, and the use of Pearson symbols to describe allotropes of the elements. It may be less romantic to describe the problems that Napoleons' soldiers suffered in Russia in 1812 when their tin buttons turned to powder due to the formation of tin *(cF8),* but is is probably more usefully scientifically (see Extract 2).

Chapter 4 deals with formulae, a subject not treated in any detail hitherto, and it introduces oxidation states and ionic charges (the terms 'Stock number' and 'Ewens-Bassett number' are no longer recommended) and shows how to assemble formulae, including those of isotopically modified compounds.

Names of compounds

Names of compounds start in Chapter 5. Here history and usage tend to force us to be less than logical. 'Sodium' is the name of the neutral atom (element) and also of the cation. 'Chlorine' is the name of the neutral atom, but the anion is called 'chloride'. Why the difference in usage? However, it is not possible to change it, and this chapter presents recommendations for names based on stoichiometry, with appropriate orders of citation.

'It may be less romantic to describe the problems that Napoleon's soldiers suffered in Russia in 1812 when their tin buttons turned to powder due to the formation of tin (cF8), but it is probably more useful scientifically.'

Chapter 6 was produced jointly with the Commission on High Temperature and Solid State Chemistry, and is vastly expanded over the matter

Arabic numerals

Arabic numerals are the keys of nomenclature. Their place in a formula or in a name therefore has a very special significance. They are used in FORMULAE in many ways.
(a) As right subscripts to indicate the number of individual constituents (atoms or groups of atoms). Usually, unity is not indicated.

Examples:
1. $CaCl_2$
2. $[Co(NH_3)_6]Cl_3$

(b) As a right superscript to indicate the charge number.

Examples:
3. Cu^{2+}
4. $[Al(H_2O)_6]^{3+}$

(c) To indicate the composition of addition or non-stoichiometric compounds. The numeral is written on the line before the molecular formula of each constituent except that unity is omitted.

Examples:
5. $Na_2CO_3 \cdot 10H_2O$
6. $8WO_3 \cdot 9Nb_2O_5$

(d) To designate the mass number and/or the atomic number of nuclides represented by their symbols. The mass number is written as a left superscript, and the atomic number as left subscript.

Examples:
7. ${}^{18}_{8}O$
8. ${}^{3}_{1}H$

Extract 1. *Part of page 22. Further examples of the use of arabic numerals in names and formulae are given on pages 23 and 24 of the Red Book.*

Examples:

	Symbol	*Trivial name*	*Systematic name*
1.	P_n	black phosphorus	phosphorus (*oC*8)
2.	C_n	diamond	carbon (*cF*8)
3.	C_n	graphite (common form)	carbon (*hP*4)
4.	C_n	graphite (less common form)	carbon (*hR*6)
5.	Fe_n	α-iron	iron (*cI*2)
6.	Fe_n	γ-iron	iron (*cF*4)
7.	Sn_n	α- or grey tin	tin (*cF*8)
8.	Sn_n	β- or white tin	tin (*tI*4)
9.	Mn_n	α-manganese	manganese (*cI*58)
10.	Mn_n	β-manganese	manganese (*cP*20)
11.	Mn_n	γ-manganese	manganese (*cF*4)
12.	Mn_n	δ-manganese	manganese (*cI*2)
13.	S_6	—	sulfur (*hR*18)
14.	S_{20}	—	sulfur (*oP*80)

Extract 2. *Part of page 41: Section I–3.7.3 on 'Crystalline allotropic modifications of an element'.*

in the previous edition. It should assist all those working in this expanding area. It discusses, for example, point defect notation (see Extract 3) and phase nomenclature.

Chapter 7 discusses the names of compounds of smaller neutral molecules. Its innovative aspect is the application of coordination nomenclature to these compounds; thus $Cl_3SiSiCl_2SiCl_3$ can be named dichlorobis(trichlorosilyl)silicon, or octa chlorotrisilicon(2 *Si–Si*). Its more usual substitutive name would be octachlorotrisilane. Coordination nomenclature is shown to be a versatile and useful tool.

Chapter 8 discusses names for ions, substituent groups and radicals, and salts. Among its recommendations are the insistence on the use of the word 'radical' to mean 'free radical' and nothing else (this is a consequence of decisions of IUPAC commissions other than CNIC); the restriction of the '-io' names (mercurio, phosphorio, etc.) to substitutive nomenclature; and an exposition of the use of 'hydrogen' in the names of acid salts.

Chapter 9 is concerned with oxoacids and derived anions. This cannot be a complete discussion of an area which has seen a proliferation of trivial nomenclatures. It excludes heteropolyacids, which will be treated elsewhere. It contains definitive tables of recommended names, and compares the preferred hydrogen nomenclature with coordination-type acid nomenclature. Mononuclear phosphorus and arsenic oxoacids are considered in some detail.

A primer for coordination chemistry

Chapter 10, the longest in the book, is almost a primer for coordination chemistry. It provides basic definitions and copious examples. The systematic way to construct formulae is carefully explained,

Table I-6.1 Examples[a] of defect notation in $M^{2+}(X^-)_2$ containing a foreign ion Q

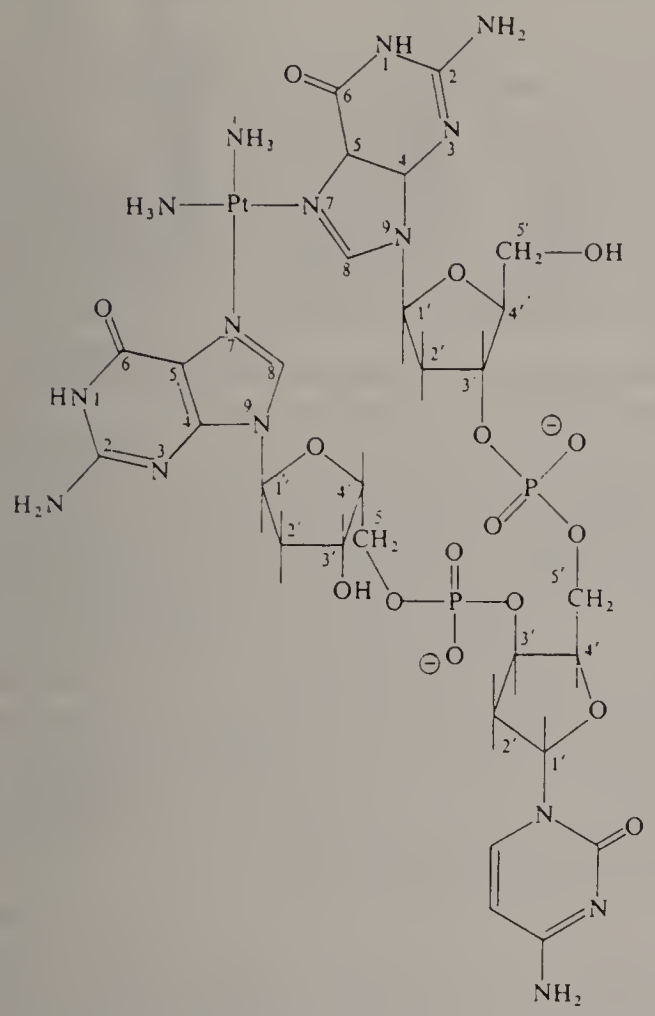
interstitial M^{2+} ion	$M_i^{\cdot\cdot}$	M atom vacancy	V_M^x
interstitial X^- ion	X_i'	X atom vacancy	V_X^x
M^{2+} ion vacancy	V_M''	normal M^{2+} ion	M_M^x
X^- ion vacancy	$V_X^{\cdot}$	normal X^- ion	X_X^x
interstitial M atom	M_i^x	Q^{3+} ion at M^{2+} site	$Q_M^{\cdot}$
interstitial X atom	X_i^x	Q^{2+} ion at M^{2+} site	Q_M^x
interstitial M^+ ion	$M_i^{\cdot}$	Q^+ ion at M^{2+} site	Q_M'
interstitial X^- ion	X_i'	free electron	e'
M^+ ion vacancy	V_M'	free hole	$h^{\cdot}$

[a] Consider an ionic compound $M^{2+}(X^-)_2$. The formal charge on M is 2+, the formal charge on X is −. If an atom X is removed, one negative unit of charge remains on the vacant X site. The vacancy is neutral with respect to the ideal MX_2 lattice and is therefore indicated by V_X or V_X^x. If the electron is also removed from this site, the resultant vacancy is effectively positive, i.e. $V_X^{\cdot}$. Similarly, removal of an M atom leaves V_M, removal of an M^+ ion leaves V_M', removal of an M^{2+} ion leaves V_M''. If an impurity with a formal charge of three positive units Q^{3+}, is substituted on the M^{2+} site, its effective charge is one positive unit. Therefore it is indicated by $Q_M^{\cdot}$.

Extract 3. *Part of page 75: Section I–6.4.4 on 'Indication of charges'.*

Very complex structures can be treated as illustrated below.

15.



diammine[2′-deoxyguanylyl-κN^7-(3′→5′)-2′-deoxycytidylyl(3′→5′)-2′-deoxyguanosinato(2−)-κN^7]platinum(II)

and there are many tables of approved names for ligands, abbreviations and so on.

Careful adherence to its recommendations will exclude from the literature nomenclature horrors such as (edta-H_4) for ethylenediaminetetra-acetate(4-) where the H_4 is designating atoms which are absent! It introduces stereochemical descriptors, polyhedral symbols, configuration indexes, and an exposition of the application of CIP (Cahn, Ingold, and Prelog) rules in coordination chemistry. Also expounded at length are stereochemical descriptors, and the K-convention for use with complex ligands (see Extract 4). The chapter finishes with a brief discussion of organometallic coordination compounds.

The last chapter deals with a contentious area, 'simple' boron hydrides. Again, the principles are expounded systematically and at length, and the chapter includes numerous depictions of molecular structure. The volume finishes with a set of tables of names, including one of 25 pages of the names of ions and groups. There is also an appendix, dealing with the Group number problem.

IUPAC President Yves Jeannin was Vice-Chairman of CNIC from 1975 to 1981 and Chairman from 1981 to 1985. He wrote the preface to the new edition.

A monument to international cooperation and goodwill

Each chapter was written by a subcommittee of CNIC under the direction of a convenor, usually the principal author, and was finally approved by the whole commission. It was checked by the Interdivisional Committee on Nomenclature and Symbols (IDCNS), and between these checks it was sent to 15 expert referees for comments and was subjected to public review in the now usual IUPAC fashion.

Every effort has been made to achieve a consensus, particularly over contentious issues, and CNIC and the editor hope and believe that they have produced a volume which will last 20 years. In

Extract 4. *Part of page 179: Section I–10.6.2.2 on 'The kappa convention'.*

IUPAC

Nomenclature of Inorganic Chemistry Recommendations 1990 ('The Red Book')

Edited for IUPAC by **G. J. Leigh**

IUPAC has responsibility for recommending nomenclature rules to the chemistry community. This latest edition of *Nomenclature of Inorganic Chemistry* ('The Red Book') contains recommendations for naming inorganic substances including the following: elements, atoms and groups of atoms; neutral molecular compounds; ions, substituent groups and radicals; oxoacids and derived anions; coordination compounds and boron hydrides and related compounds.

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'Pass me the 1,1,1,3,3,3-hexacarbonyl-2,5-dicarba-1,3-diferra-*closo*-heptaboran-6-yl please'.

an attempt to encourage wide dissemination, the book is available both in hard and (cheaper) soft cover.

During the preparation of this volume, CNIC has had four different chairmen, four secretaries, 16 titular members, 33 associate members and 22 national representatives, and has received help from numerous experts in nomenclature, and from practising chemists. There are 13 listed authors. The book is truly a monument to international cooperation and goodwill, and to the efficient if cumbersome IUPAC process.

Even this tremendous effort could not deal with the whole of inorganic nomenclature. CNIC envisages this volume as the first in a series. Subsequent volumes will deal with more specialized areas of nomenclature, such as heteropolyacids, organometallics, and labelled compounds. Some of this material has already been published in *Pure and Applied Chemistry* and work on Volume II is already in progress.

I would like to make one final, personal point. Throughout the Red Book, CNIC has used its 1–18 numbering scheme for the Periodic Table. A long form has been used, but CNIC has never tried to impose a particular form of the table, indeed, it cannot impose anything. It seeks to express a consensus. There has been an outcry in some quarters against the 1–18 proposal. The proponents of the proposal have generally kept quieter. However, many national organizations, especially on the eastern side of the Atlantic, have adopted the 1–18 system, and the Red Book shows its efficacy and simplicity. It is my own wish that the Red Book will hasten the development of an international, rational consensus in favour of the proposal of CNIC and IUPAC.

Nomenclature of inorganic chemistry: Recommendations 1990 *edited by G. J. Leigh was published by Blackwell Scientific Publications Ltd, Oxford, UK, 1990. xxi + 289 pp. ISBN 0-632-02319-1/0-632-02494-1 (pbk). Prices: hardback GBP 39.50/USD 70.00; paperback GBP 15.50/USD 27.50. Affiliate members discount prices: hardback GBP 29.60/USD 52.50; paperback GBP 11.60/USD 20.50.*

The delayed discovery of nuclear fission

Norman E. Holden

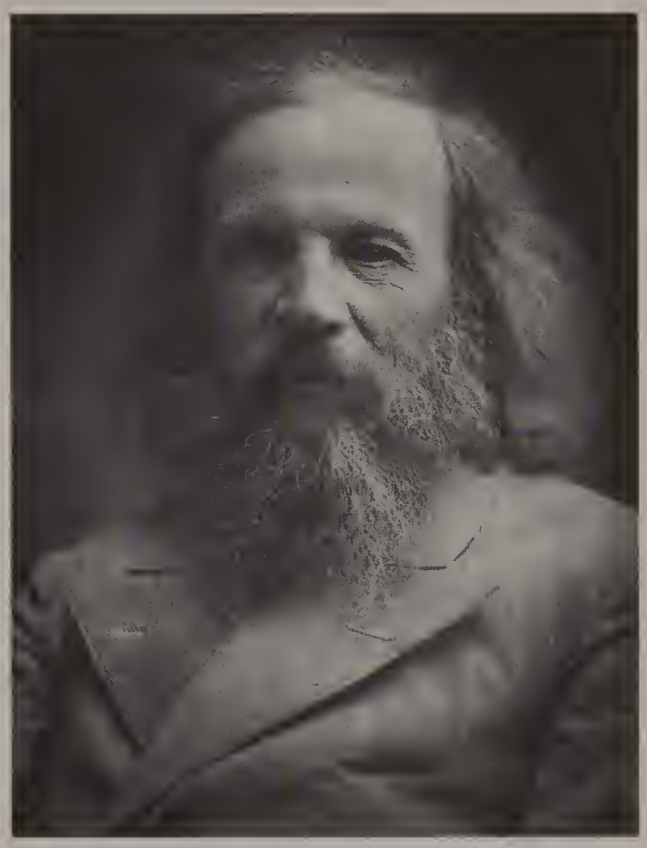
Last year marked the 50th anniversary of the discovery of nuclear fission. Norman Holden recounts the events which led up to the discovery and puts them into their historical perspective. He discusses the role played by Mendeleev's Periodic Table, the role of the natural radioactive decay chain of uranium, the discovery of protactinium and the apparent discovery of masurium (technetium). He also speculates on the reason why Iréne Curie may have missed the discovery of nuclear fission.

Introduction

In the early 1930s, the neutron was discovered, followed by the discovery of artificial radioactivity and then the use of the neutron to produce artificial radioactivity. The first experiments resulting in the fission of uranium took place in 1934.

A paper which speculated on fission as an explanation was almost immediately published, yet no one took it seriously, not even the author herself. Why did it take an additional 5 years before anyone realized what had occurred? This is an abnormally long time in a period when discoveries, particularly in nuclear physics, seemed to be an almost daily occurrence.

In reviewing historical developments, it is difficult to ignore one's own knowledge of events subsequent to the historical period being studied. In this case — the discovery of nuclear fission — one is aware of the present form of the latest version of the Periodic Table and the Chart of the Nuclides. We now have available separated isotopes, sophisticated experimental instrumentation off the shelf, methods of radiochemical separation of elements and of mass separation of the isotopes of any chemical element, extensive computer databases giving the properties of targets, projectiles and reactions, as well as the latest versions of all the theories of nuclear matter.



Dmitri Mendeleev was author of the Periodic Table, which was used by scientists to predict the chemical properties of new elements and determine where they fit in the chemical scheme of elements.

Norman E. Holden was Chairman of the Commission on Atomic Weights and Isotopic Abundances from 1979 to 1983 and also the United States National Representative to the Commission on Radiochemistry and Nuclear Techniques. His address is: Brookhaven National Laboratory, Upton, New York 11973, USA.

The status of present day knowledge and technology mentioned above makes it all the more difficult to appreciate the problems that scientists might have encountered in a prior time period. To understand why 5 years elapsed after the experimental realization of nuclear fission before scientists discovered what had happened, it is necessary to go back in time and try to describe the atmosphere that the scientists were dealing with in those years, including political events.

Early background

Let us begin by going back in time, not 50 years but 120 years. Between 1869 and 1871 the Russian chemist Dmitri Mendeleev proposed his form of the Periodic Table of the Chemical Elements. Although others had preceded him by decades in presenting and developing portions of such a table, only Mendeleev is now associated with it because he used the periodic properties of the elements as a function of their atomic weight values to revise measured values and to predict the properties of undiscovered elements[1]. Over the next 15 years, all three of his predicted elements were discovered, i.e. gallium (Mendeleev's eka-aluminium), scandium (eka-boron), and germanium (eka-silicon), where Mendeleev used the prefix 'eka', 'dvi' and 'tri' (Sanskrit: one, two, three) to indicate an element with similar properties in the next, second, or third removed period (next higher Z elements in the same group) of the table.

When Lecoq de Boisbaudran discovered gallium in 1879[2], he obtained a value of 4.7 for the density. However, Mendeleev insisted that this element was his eka-aluminium and that de Boisbaudran's value was incorrect and should be closer to his prediction of 5.9. To answer Mendeleev, de Boisbaudran remeasured and obtained a value of 5.956 for the density. Scientists were extremely impressed by the fact that Mendeleev knew more about a new element from theory than the discoverer of that element did from his experiment. Scientists began to rely on the Periodic Table as an aid in the discovery of new elements.

Toward the close of the nineteenth century, a prevailing view was that 'all processes of science had been discovered and the only thing left to do was to extend the values of physical parameters to the next decimal place'.

The twentieth century

By the start of the twentieth century, the discovery of radioactivity, X-rays, and radioactive transformations heralded the beginning of a new age. In 1913, the English physicist Henry G. J. Moseley compared the energy of the X-ray spectral lines of various elements against their atomic weight and obtained an approximate straight line[3]. To avoid breaks in this graph, it was necessary to place argon–potassium, cobalt–nickel, and tellurium–iodine in the order demanded by chemical properties rather than increasing atomic weight. According to his curve of X-ray lines each element has a constant value, its atomic number (nuclear charge = Z), which increases by a constant amount from element to element.

A major activity for scientists seemed to be the attempt to fill in the missing places in Mendeleev's table, using Moseley's law to determine the atomic

Henry G. J. Moseley's study of the X-ray spectra of elements verified that the atomic number and not the atomic weight was the basic parameter of the Table of Chemical Elements and enabled scientists to determine the number of elements available.

number. One problem was rare earth elements which did not seem to fit. They were usually omitted. Danish physicist Niels Bohr[4] proposed the electronic orbital structure of the atom. It indicated for rare earth elements that inner electron shells were being filled. This clarified their position in the table.

In 1913, Lise Meitner and Otto Hahn, a German physicist and chemist respectively, decided to search various ores to locate the immediate precursor of actinium. Hahn had previously discovered radio-thorium, ^{228}Th, as well as meso-thorium, ^{228}Ra, and he had developed expertise in separating radium from other radioactive substances. However at the time, Hahn's radio-thorium was described by a radioactivity expert as a new compound of thorium-X, ^{224}Ra, and stupidity[5]. Of course, Hahn's attempt to separate meso-thorium, ^{228}Ra, and radium, ^{226}Ra chemically, would prove futile. However, the experience Hahn gained from this attempt would prove useful later.

Actinium was a very scarce element with an unknown atomic weight and an uncertain chemistry. It headed a natural decay chain, which was distinct from the uranium–radium series but was found in uranium-bearing minerals in amounts directly proportional to the uranium content. Protactinium was discovered in 1918 after a painstaking search, which Meitner continued on her own between 1916 and 1918 while Hahn was in the Army heading the German chemical warfare effort under Fritz Haber. The name *Lisottonium* was suggested for this element after the discoverers, but they declined this honour[6].

In 1922, Bohr applied his theory and the Periodic Table to help discover an element. In 1911, the French chemist George Urbain claimed the discovery of an element with Z = 72, 'celtium', having properties similar to those of the rare earth elements[7]. Bohr knew his theory required element 72 to have properties similar to those of zirconium and not of the rare earths. He recommended to Dirk Coster and George von Hevesy working at his Institute in Copenhagen that they look for the missing element in zirconium ores. They found hafnium[8]; it was later shown that 'celtium' had resulted from a mixture of other rare earth elements.

In 1925, Berlin chemists Ida Tacke and Walter Noddack claimed[9] the discovery of eka-manganese and dvi-manganese, which they called masurium (Z=43) and rhenium (Z=75), respectively. They observed Moseley's X-ray lines for these elements in various ores selected on the basis of possible overlap with the hypothetical properties of the missing elements. Rhenium was later confirmed by others, but masurium never was.

In 1937, Emilio Segre and co-workers discovered technetium (Z = 43) in molybdenum samples[10] that had been supplied by the Berkeley California physicist, Ernest Lawrence, who had bombarded the samples with deuterons (heavy hydrogen nuclei) in his cyclotron. As it is now known that there are no stable isotopes of element 43, the Tacke–Noddack claim to have observed X-rays from element 43 in naturally occurring ore is no longer accepted; Segre is now accepted as the discoverer.

Pieter van Assche[11] has recently claimed that the discrediting of the masurium discovery caused scientists to ignore a 1934 paper by Tacke and Noddack, which as we shall see, could have explained Fermi's first fission measurement in 1934. Van Assche went on to defend the original paper on masurium by observing that the ore in which the X-rays were detected had a significant amount of uranium and the spontaneous fission process in ^{238}U could explain the existence of masurium as a fission product in the ore. Whether or not Noddack's claim is considered valid, Segre only discovered technetium in 1937. In any case, the non-acceptance of the masurium claim could not have affected judgments about Noddack's fission proposal paper in 1934, 3 years earlier.

Iréne Joliot-Curie and (right) Frédéric Joliot missed the discovery of the neutron but did discover artificial radioactivity.

The fateful and eventful decade

As the 1930's began, a burst of activity marked the beginning of the era of nuclear physics. At that time, the nucleus was thought to be made up of both protons and electrons. The existence of electrons in the nucleus was introduced to explain the β^- (negative electron) decay of natural radio-isotopes.

In 1919, New Zealand physicist Ernest Rutherford, who had proposed the atomic transformation theory of radioactive change and who was first to split an atomic nucleus, was appointed to head the Cavendish Laboratory at Cambridge University, after the retirement of the discoverer of the electron, J. J. Thomson. In a 1920 Bakerian lecture[12], Rutherford said that there must exist in nature a particle with the same mass as a hydrogen atom, but with a zero electric charge, to explain the phenomenon of radioactivity.

French physicist Frédéric Joliot, later indicated that he had never bothered to read Rutherford's remarks (much to his regret) since he wrongly assumed that a public lecture would contain the usual display of oratory but no new ideas[13]. In addition, theoretical work was never highly regarded in the Paris laboratory where Joliot worked. His mother-in-law, the double Nobel prize winner Marie Curie, once responded to a theoretical physicist's recommendation that a particular experiment be performed, with a comment that they might even perform the experiment in spite of that suggestion[14].

Rutherford and his chief assistant, James Chadwick, spent 10 years trying to find the neutron without success. In 1932, Joliot and his chemist wife, Iréne Curie, reported that α-particles, from a polonium source, bombarding a beryllium target had produced radiation that knocked protons out of hydrogen atoms. The Joliots thought that they had observed a γ-ray Compton effect[15], even though there were theoretical problems with the assumption of γ-rays. Theory was not highly regarded at the Paris laboratory, as was just mentioned. Chadwick did not believe that this radiation was γ-rays. He proposed that the observed radiation was the elusive neutron that Joliot had not previously heard

about. He proceeded to verify this assumption[16] and is now credited as the discoverer of the neutron.

Having missed this discovery, Joliot and Joliot-Curie were not to miss their next opportunity. Two years later in 1934, they bombarded aluminium with α-particles from polonium and the emission of β^+ (positrons — positively charged electrons) did not cease immediately when the polonium source was removed from the target, but continued to be emitted with an exponential decay characteristic of natural radionuclides[17]. Ernest Lawrence had noted the same phenomenon using his cyclotron as the source of charged particles. He found that his counters misbehaved after the cyclotron was shut off. However, he 'corrected' the malfunction by arranging to shut off automatically the counters as soon as the cyclotron was turned off[18].

In those days, Geiger counters were very erratic. Joliot thought, 'either my counter is not working or I have made a fundamental discovery.' He was just leaving for a dinner party and asked a colleague to check the counter and leave him a note. The Joliots arrived at the laboratory in the morning to find a message stating that the counter was working perfectly[19]. *Artificial radioactivity has been discovered.* The Joliots determined that this only occurred with light element targets. The Coulomb barrier would prevent the polonium α-particles from approaching the heavy target nucleus closely enough to cause a nuclear reaction.

As soon as the Joliots published, everyone rushed to duplicate their work. However, instead of trying to duplicate this work, the University of Rome physicist Enrico Fermi put together the ideas of the neutron and of artificial radioactivity and in a matter of weeks produced nuclear fission.

Chemical techniques and the Periodic Table

At this point in the story, let us pause to discuss chemical techniques that will be critical to understanding much of what follows. It has already been mentioned earlier that the Periodic Table was useful for indicating that elements in the same group would have similar chemical properties. They would all combine with the same elements, have similar solubility properties and in general would behave in a similar manner. This was useful when radioactivity was discovered.

Chemical identification of a radioactive nuclide usually required precipitation of a compound of that nuclide from a solution. Following a nuclear reaction, the irradiated sample is put into solution and a very small amount of a stable element, the *carrier*, is added. If the carrier is isotopic to the radioactivity or belongs to the same group in the Periodic Table, this radioactivity will precipitate out of solution with the carrier when a sufficient amount of carrier is added to saturate the solution. The presence of the radioactivity in the precipitate is easily recognized by its characteristic half-life and radiation.

Another chemical technique is the tracer or indicator method, where a small amount of known radioactive material is added to a mixture and the result is precipitated. If the radioactivity is found to be precipitated, then it is known that the mixture is an element isotopic to the radioactive tracer.

In the Periodic Table of the time, the rare earth elements were recognized as belonging in a separate location in the table but the concept of actinide elements had not yet been identified. This would have to await their discovery and a study of their chemical properties. Thorium, protactinium, and uranium were considered to be 6d elements (and not 5f elements as now known), i.e. the analogues of hafnium, tantalum, and tungsten[20]. Elements 93 and 94 were also considered to be 6d elements, i.e. the analogues of rhenium and osmium. Thus, element 93 was considered to have properties similar to rhenium and not uranium.

This error affected the thinking in the complicated analysis of experiments to follow and would play a role in the long delay in the discovery of fission.

Fermi's neutron-induced reactions

While most scientists knew that sources of neutrons would be very much weaker than α sources. Fermi did his experiments realizing that proton, deuteron and α-particles would all suffer Coulomb repulsion in a heavy nucleus and would never cause a nuclear reaction. Thus neutrally charged neutrons, although weak, would still be much more effective than the α-particle. He proposed irradiating all elements, even heavy ones, with neutrons to study artificial radioactivity.

In a series of 1934 papers, Fermi's Rome group[21] reported the irradiation of all available elements up to uranium with neutrons, and the resulting production of radiations with characteristic half-lives. Most of the radioisotopes produced, decayed by emitting β^- particles (negatively charged electrons) to become atoms of the next (higher Z) chemical element. Whereas most target elements produced one radiation and half-life, Fermi obtained four radiations with the half-lives 10 and 40 seconds and 13 and 90 minutes from uranium.

Reasoning by analogy from the behaviour of medium-weight elements, Fermi's group thought they had produced radioisotopes by neutron capture. Since β^-s were emitted, they concluded that the isotopes were of elements beyond uranium in the Periodic Table. By various chemical techniques, they eliminated all of the known possible candidate elements between lead and thorium and concluded that they had *created* element 93 and possibly 94, which did not exist in nature[22]. The

Ida Tacke Noddack. Her article contained the concept of nuclear fission, although no one took it seriously.

Rome group would call them ausenium, and hesperium, respectively[23].

For target elements below uranium and thorium, the only possible reactions were neutron capture (n,p) or (n,α). These reactions were also considered as the only possibilities for thorium and uranium. This was the second major error in thinking. However, Fermi did not believe in creating new phenomenon just to explain new data.

Fermi also used paraffin to slow down the neutron's velocity and discovered that slow neutrons produced increased radioactivity in the target element[24]. Thus, the likelihood of forming radioactivity was not proportional to neutron energy (velocity), as one might initially have expected. The charged particle reactions (n,p) and (n,α) were an exception. In general, they only occurred with high energy neutrons. This would also confuse later thinking, when the possibility of emitting elements heavier than α-particles with thermal neutrons was discarded as unphysical, so nuclear fission was never a possible solution.

One member of Fermi's five man group, Edoardo Amaldi[25], noted that the group wrote short letters in Italian to *La Ricerca Scientifica*, received what we now call preprints, and distributed these to 40 prominent and active nuclear physicists all over the world in order to communicate these results rapidly. Fermi, who up to that time was probably best known for his theoretical work explaining β^- decay, received a reply from Rutherford thanking him for the preprint and congratulating him on his 'escape' from theoretical physics. Thus, we can see that many prominent experimentalists of that day did not view theoreticians in a very favorable light. Contrast this with science today.

Reports immediately appeared from Aristid von Grosse[26], a German-born chemist from the University of Chicago and from Ida Tacke Noddack[27]. Von Grosse had done early work on protactinium with Hahn, soon after its discovery and he mistakenly thought that one of the activities behaved like that element. Von Grosse did not use irradiated uranium but a strongly acid solution of uranil nitrate, which Fermi's group had used. A small amount of protactinium was added. Von Grosse precipitated manganese dioxide along with protactinium. The experiment failed when it was repeated with rhenium, which was considered a lower period member of the same group as element 93 in the Periodic Table of that day, as mentioned earlier. Von Grosse concluded that protactinium, and not element 93, was the activity produced.

Because of her work on its discovery, Lise Meitner considered protactinium to be 'her' element. By 1934, she had not worked with Hahn for over a decade. She tried for weeks before finally convincing him that they should take up this protactinium problem[28]. Their interest in the uranium problem would continue long after von Grosse was proven wrong about protactinium.

Von Grosse also published[29,30] additional articles questioning the claim of elements 93 and 94. He suggested that they might belong to a second group of rare earth elements in the Niels Bohr sense. Apparently no nuclear physicist or radiochemist actively involved read these two articles until after fission was discovered. Even Niels Bohr, whose theory had explained the first rare earth series, never gave this issue any thought. Thus, the actinide concept would be delayed for a decade.

Noddack's article contained the concept of nuclear fission, although no one took it seriously. She stated that it was conceivable that in the bombardment of heavy elements with neutrons the nuclei might break into larger pieces, which are isotopes of known elements, but not neighbours of those irradiated. Her proposal was considered wholly incompatible with the known laws of physics and she hesitated for a long time before sending her paper to the journal. On the way to a Moscow conference, she debated with her husband and finally mailed the manuscript at a stop in Warsaw[31].

Noddack's proposal was viewed as pure speculation, pointing out a lack of rigour on Fermi's part in not eliminating all other possible elements before he claimed the discovery of transuranium elements. It was never taken seriously. Noddack never attempted an experiment to follow up on her own proposal, and no one else ever did either.

The known fact that the Coulomb barrier prevented charged particle emission in heavy elements for the α-particle and the proton would argue against an even heavier charged particle emission of a fission fragment, particularly for irradiation with room temperature neutrons. Keep

in mind that Bohr's liquid drop model of the nucleus would not be published for a few more years and no one up to that time had considered the possibility of the collective motion of the nucleons. Noddack always remained very mad at Hahn for ignoring her paper[31].

By 1936, the Rome group itself fissioned as three of the members moved on to positions at other locations in Italy and the USA. Only Fermi and Amaldi remained and their interest turned to the problem of the selective energy absorption of neutrons. They left this uranium problem in the hands of groups more experienced in the area of radiochemistry, such as Meitner, Hahn and the Joliot-Curies. Fermi eventually left for the USA in 1938, after he was awarded the Nobel prize for his neutron work, because his wife was Jewish and he was concerned about the effect of racial laws recently enacted in Italy.

Lise Meitner and (right) Otto Hahn whose work led to the discovery of nuclear fission, although Hahn received the credit.

Paris and Berlin get involved

After dismissing Noddack's paper as not worth pursuing, Meitner and Hahn[32] repeated von Grosse's 1934 protactinium work, and concluded that the elements from 92 down to 80 were excluded, so the radioactivities seen were probably from elements beyond uranium, Z = 92. The 10 and 40 second activities were too short to work with but they stated that the two half-lives of 13 and 90 minutes reported by Fermi could be separated and that the 90 minute activity was from a mixture of two elements. From a series of experiments, they concluded that the chain of β^- decays observed corresponded to elements 93, 94, 95 and 96.

The Paris group headed by Iréne Joliot-Curie did not initiate work with uranium but with thorium[33]. There were three naturally occurring radioactive decay chains known at the time, i.e. 4n+2, and 4n+3. They reasoned that neutron irradiation of thorium might produce the non-existent 4n+1 decay chain. When Meitner and Hahn began to measure a number of different chains of radioactive half-lives in the uranium irradiation[34], the Paris group did not accept Hahn's results.

Although Hahn originally discovered nuclear isomers[35] and a few nuclear isomers were known, i.e. nuclei which have the same atomic number and mass number but different radioactive properties, Meitner and Hahn were finding triple isomers which were decaying into triple isomers, which even Meitner found disturbing[36]. Meitner was also concerned when they found a long sequence of successive β^- disintegrations[28], which were unknown in other naturally occurring heavy element decay. An upper limit of two β^- decays were usually followed by an α-particle decay.

Joliot-Curie decided to follow a single radioisotope rather than Hahn's mixture. A major problem in this type of radiochemical work was the existence of the natural radioactive background of the uranium decay chain. The Berlin group had avoided this problem by purifying the uranium before the experiment. In contrast to the Berlin group, Joliot-Curie and the Yugoslavian chemist Pavel Savić wrapped the irradiated uranium target in copper foil to measure the activity,' while suppressing the natural radioactive background of the uranium decay chain.

The Paris procedure removed the β^- radiation of UX_2 (^{234}Pa) and any other β^- radiation with an energy of 2 MeV or less. With the lower energy radiations removed, the French group found a 3.5 hour half-life that was missed by Meitner and Hahn. At first, Curie and Savić reported that the 3.5 hour radiation behaved like thorium[37], but later discovered that they could separate it from thorium. Chemical tests revealed that it precipitated with a lanthanum carrier and a check of the Periodic Table suggested that it must be actinium from the same group[38].

It is interesting to note that the 3.5 hour activity did not completely follow lanthanum. If it had, this might have led Curie and Savić to question why it could not be separated from the lanthanum. From our present vantage point, it might well have been a mixture of 3.9 hour ^{141}La with a β^- endpoint of 2.43 MeV, with 3.54 hour ^{92}Y with a β^- endpoint of 3.6 MeV. Curie made the comment in 1938 that she sometimes thought that she had all the chemical elements in her bombarded uranium[28]. Curie and Savić concluded that they might have element 93 and the Berlin group's elements might be 94–97[37]. This would imply that Hahn's previous papers analysing Berlin's experiments as elements 93 – 96 would all be incorrect.

These publications by Curie irritated Hahn, who told Frédéric Joliot[39] in 1938, 'the work of your wife

is so wrong, but as she is a lady I don't want to ridicule and publish what I think of her work'. Hahn thought that since all of his work was now in trouble because of Curie, he would have to take time off to 'straighten her out'. Hahn called this 3.5 hour half-life element 'curiosum'[40].

Effect of the political situation in Germany

After Meitner and Hahn's initial experiments, they asked a young chemist, Fritz Strassman, to join in the work. They worked together until July 1938. With the advent of Adolph Hitler's rise to political power in 1933, Nazi Germany passed a series of racial laws which circumscribed the rights of people of Jewish heritage. Although Lise Meitner was Catholic, she had 50% Jewish blood. However, she was protected because she was not German, but Austrian. When Germany annexed Austria in the 'Anschluss' in 1938, Meitner came under the German racial laws and would be forced to leave Berlin.

The German Chancellor, Adolph Hitler, created the Brown Shirt militia (storm troopers), whose members often wore their uniforms in the workplace and informed on any anti-government attitudes or comments by their fellow workers. There were a number of these Brown Shirts working in Hahn's institute at that time. Concern about Meitner's situation caused Hahn considerable mental anquish at the time that he was trying to unravel the mystery of fission.

When the Berlin group repeated Curie's experiments[41], they used both barium and lanthanum as carriers of their 'radium' activity and its 'actinium' daughter and found three of the radioactive half-lives were precipitated with the barium carrier. From the Periodic Table, this implies that the activities belonged to radium, which must be formed via two α decays from ^{239}U.

This led to a search for these α-particles. Meitner asked one of the Brown Shirt physicists in the laboratory named Gottfried von Droste to search for these α-particles with an oscilloscope and air chamber, but he was not successful in finding the two α-particles[42]. Von Droste complained that since Hahn the chemist knew he had radium, there must be alphas, and Meitner called von Droste a lousy physicist because he couldn't find them. The high voltage air chamber took in the α-particles and they were displayed on the screen of the oscilloscope. Occasionally, the beam would soar off the screen and disappear and they had to wait for it to return. Von Droste attributed it to electrostatic effects, which was anything that didn't turn out right[43].

He solved the problem by using thin aluminium foil which stopped the pulses. If he had turned down the magnification, he might have seen the fission fragment pulses. Other lab's had a similar problem using foils. At the UK's Cavendish laboratory, for

Niels Bohr. His liquid drop model of the nucleus was used to understand and explain the process of nuclear fission.

example, Chadwick and Maurice Goldhaber used a foil to eliminate the α-particles from the uranium natural decay chain which, unfortunately, also eliminated any fission fragments[44].

An additional confusing problem was the fact that these two consecutive α-particle reactions occurred at slow neutron energies, whereas (n,α) reactions usually required fast neutrons. However, it was obvious that these low energy reactions had to occur in order to obtain radium and its daughter, actinium, from neutron-irradiated uranium.

The discovery of nuclear fission

In July, following the 1938 Anschluss, Meitner was smuggled out of Germany to Groningen, The Netherlands by Dirk Coster, who received a telegram from Wolfgang Pauli: 'You have made yourself as famous for the abduction of Lise Meitner as for the discovery of hafnium'[45]. In August, Meitner arrived in Sweden, where Manne Siegbahn offered her a position in his Institute in Stockholm. Hahn and Strassman continued their experiment, trying to separate their 'radium activity' from the barium carrier. They added ^{228}Ra ($MsTh_1$) to their solution.

Hahn had unsuccessfully tried to separate $MsTh_1$ from radium at the beginning of his radiochemical career as mentioned above. When barium bromide is precipitated *fractionwide*, radium is strongly enriched in the first fractions and depleted in the last fractions. However, instead of the 'radium activity' going with the $MsTh_1$, after successive fractional precipitations and crystalizations, it remained uniformally distributed. They had *barium* and not *radium*.

They concluded their famous paper with — 'on the basis of the briefly reported experiments, we should as chemists replace the symbols Ra, Ac, Th with Ba, La, Ce. As "nuclear chemists" who are close to physics in certain ways, we cannot yet bring ourselves to take this jump which contradicts all of the experiences of nuclear physics to date. Perhaps

it is still possible that a number of strange chance incidents have distorted our results.'[46] Hahn later indicated that his reluctance to take a stronger position was not due to any doubts about the results but as a chemist he hesitated to announce a revolutionary discovery in physics[47]. This thinking could be contrasted with the present day situation in the reports of 'cold fusion'.

Events now moved very quickly. Hahn wrote to Meitner, who replied: 'I find it very difficult to assume such a degree of bursting, but we've had so many surprises in nuclear physics that one can't very well say it's impossible'[36]. Meitner's nephew, the Austrian physicist Otto Frisch, visited her in Stockholm while on Christmas leave from Niels Bohr's Institute in Copenhagen. Using Bohr's liquid drop model, they were finally able to understand what had occurred[48]. They explained Hahn and Strassman's results and Frisch coined the term 'nuclear fission' from biology. They concluded that the two fragments formed should repel each other with a very high energy and Frisch subsequently verified the strong pulses of the fission fragments in an ionization chamber[49].

Conclusion

The delay in the discovery of nuclear fission has been seen to be due to a number of factors or errors. The form of the Periodic Table of the day misled the scientists into looking at the wrong chemistry. The fact that Fermi's results for low and intermediate weight elements irradiated by neutrons always led to residual nuclei very close to the target element kept them from any serious consideration of the fission proposal. The very low esteem accorded to theoreticians by the experimentalists did not help the Noddack proposal and the fact that no attempt to investigate that proposal, even by the author herself, led to even further delay.

Finally, it is interesting to note that of the major characters involved in this scientific work that led to the discovery of fission there were three women. Ida Noddack's proposal, which could have led to an earlier discovery of fission, was completely ignored. One can only speculate on how world affairs might have changed if Hahn, Meitner and Strassman had made their discovery in 1934 rather than 1938–39. There would have been a period of years for German scientists to speculate about the possibilities of a nuclear chain reaction prior to the outbreak of the war in 1939.

Iréne Joliot-Curie was on the verge of the discovery but the mixture of fission products in her lanthanum fraction did not allow her to question the failure to separate the activity from the lanthanum carrier. Political events prevented Lise Meitner from her fair share in the discovery of nuclear fission and prevented Otto Hahn from even acknowledging Meitner's role in leading the team up to that previous summer prior to the discovery. Only in the last few years has Meitner's significant part in the events leading up to the discovery received adequate recognition.

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Recent Reports

In this section we publish summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports. The full texts of these recommendations and reports are published in *PAC*.

Total half-lives for selected nuclides

Measurements of the half-lives of ^{3}H, ^{10}Be, ^{14}C, ^{26}Al, ^{40}K, ^{39}Ar, ^{53}Mn, ^{87}Rb, ^{92}Nb, ^{129}I, ^{138}La, ^{147}Sm, ^{174}Hf, ^{100}Ta, ^{187}Re, ^{186}Os, ^{190}Pt, ^{204}Pb, ^{210}Pb, ^{222}Rn, ^{224}Th, ^{226}Ra, ^{227}Ac, ^{228}Ra, ^{228}Th, ^{230}Th, ^{232}Th, ^{231}Pa have been compiled and evaluated. The effect of the ^{14}C half-life value on carbon-dating ages is discussed as well as the stability of ^{204}Pb.

This report was prepared for publication by Norman E. Holden, Commission on Radiochemistry and Nuclear Techniques (V.7), Analytical Chemistry Division, and published in PAC, *Vol. 62, No. 5, pp. 941–958, 1990.*

Determination of *n*-3 and *n*-6 unsaturated fatty acids in vegetable oils and fats by capillary gas liquid chromatography: results of a collaborative study and standardized method

The development, through collaborative study, of a standardized method for the determination of the content of (*n*-3 and (*n*-6) unsaturated fatty acids in vegetable oils and fats is described.

The procedure involved the preparation of methyl esters of fatty acids and then the analysis of the fatty acid methyl esters by gas–liquid chromatography on capillary columns. Identification of the unsaturated fatty acids has to be carried out using available standards or gas chromatography–mass spectrometry (GC–MS) methods.

This report was prepared for publication by J. L. Beare-Rogers and A. Dieffenbacher, Commission on Oils, Fats and Derivatives (VI.3), Applied Chemistry Division, and published in PAC, *Vol. 62, No. 4, pp. 795–802, 1990.*

Information on training in radiochemistry and nuclear techniques

In recent years the scientific community has been alarmed by reports of a decline in training in nuclear and radiochemistry (NRC), substantiated by a reduction in the number of relevant chairs at universities. At the same time, there have been indications of a shortage of trained nuclear and radiochemists in countries with advanced nuclear energy programmes.

This situation none the less reflects the multifarious applications of radionuclides and radiochemical techniques to life sciences, radiopharmacy, environmental studies, etc. A decrease in opportunities of training in basic NRC may in turn affect its general future.

In an attempt to obtain a clearer picture of the situation, the Commission on Radiochemistry and Nuclear Techniques has conducted a world-wide inquiry on training in the field of NRC. For this purpose a questionnaire was sent to correspondents in about 80 countries.

In order to facilitate the compilation, it was requested that information be presented under three headings: (i) training information at universities and other institutions; (ii) contact for other activities; and (iii) technical information.

The final report covers 59 countries. A few countries active in the field could not be included because there was no response to the questionnaire in spite of reminders.

The report concludes that, with minor exceptions, training in NRC is given in all recorded countries at some level. Emphasis is placed on the handling of radioisotopes, on health physics, applications to life sciences and on environmental studies. A large part of the training programmes is oriented towards nuclear medicine and radioanalytical techniques. Education in NRC is a general concern and the necessity of providing scientists specialized in the field is well understood.

This report was prepared for publication by J.–P. Adloff, Commission on Radiochemistry and Nuclear Techniques (V.7), Analytical Chemistry Division, and published in PAC, *Vol. 62, No. 5, pp. 959–1002, 1990.*

Gibbs energies of transfer into aqueous alcohols

This report is Part 5 of the series 'Thermodynamic functions of transfer of single ions from water to non-aqueous and mixed solvents (based on an extrathermodynamic assumption)'.

Literature data on the standard molar Gibbs energies of transfer of ions X from water W into aqueous alcohol mixtures W + S, $\Delta_t G^0$ (X, W → W+ S)/kJ on the mol L^{-1} scale at 25°C, are compiled to the end of 1986 and evaluated according to criteria established in previous parts.

The data are presented at evenly spaced mass fractions *w* of the alcohol in the mixture, interpolated where necessary. In the cases of a few ions transferring into aqueous methanol or ethanol 'selected' values are suggested. Smoothing equations relating to $\Delta_t G^0$ (X, W → W+S) to the mass fraction *w* of S in the mixture are then presented.

This report was prepared for publication by Y. Marcus, Commission on Electroanalytical Chemistry (V.5), Analytical Chemistry Division, and published in PAC, *Vol. 62, No. 5, pp. 899–940, 1990.*

Commission & Committee News

Nomenclature of organic chemistry

The Commission on Nomenclature of Organic Chemistry (III. 1) met from 4 to 10 August 1989 at the Lund General Assembly for its annual working session. It began by debating its role in meeting the needs of chemists in today's world, and by considering recommendations to the Organic Chemistry Division Committee for restructuring the commission and the division, in order to meet the objectives of IUPAC more effectively.

Although there was a wide spread of views, which were spiritedly propounded, there was general agreement that nomenclature has a unique importance, and that continuity in the work is essential.

The commission was very concerned about the methods used by IUPAC administration to evaluate its work: appraisals of the efforts of IUPAC commissions seem to reflect preoccupation with the length of time that a project has been underway. The members felt that too little regard has been paid to the difficulty of projects and their magnitude. This situation encourages projects of narrow scope, and thus probably shallow treatment, that can be completed in a short time. This puts the commission on the horns of a dilemma, since it has been criticized in the past for having too many projects on its agenda.

Lund: where the Commission on Nomenclature of Organic Chemistry indulged in a healthy catharsis of steam emission.

Commission III.1 has produced a large number of recommendations ('rules') integrated into major projects that span a very broad area of chemistry and many of its current projects deal with revising and extending recommendations in similarly large areas – such as fused-ring structures and natural products.

Ensuring that the recommendations are not in conflict with earlier ones, or with recommendations from closely related disciplines, take up a lot of the commission's time. Projects that are narrowly focused can produce additional complications, and are especially prone to generate inconsistencies when merged into a final publication.

The members felt that the size and complexity of providing systematic, self-consistent rules for naming the millions of organic compounds now known, and those that will eventually be prepared, has not been publicized enough. The commission is concerned that shirking its obligation to the international community would result in the development of a nomenclature designed unilaterally for information storage and retrieval and not necessarily for easy recognition and effective communication.

Discussion about these matters, both in and out of formal sessions, was a major part of the meeting in Lund – unlike previous meetings. Letting off steam in this way was probably a healthy catharsis.

The commission is engaged in several projects that are difficult as well as comprehensive. Two of them, 'A guide to IUPAC nomenclature of organic compounds. Recommendations 1989' (Part I of an extensive revision and expansion of the 1979 edition of the IUPAC 'Blue Book' *Nomenclature of organic chemistry* (276 pp.) and 'Revised nomenclature for radicals, ions, radical ions, and related species. Recommendations 1990' (a comprehensive revision of Section C-0.8 of the 1979 rules – 123 pp.) have been approved by the Interdivisional Committee on Nomenclature and Symbols (IDCNS) for release to the public for review after comments from IDCNS members have been evaluated.

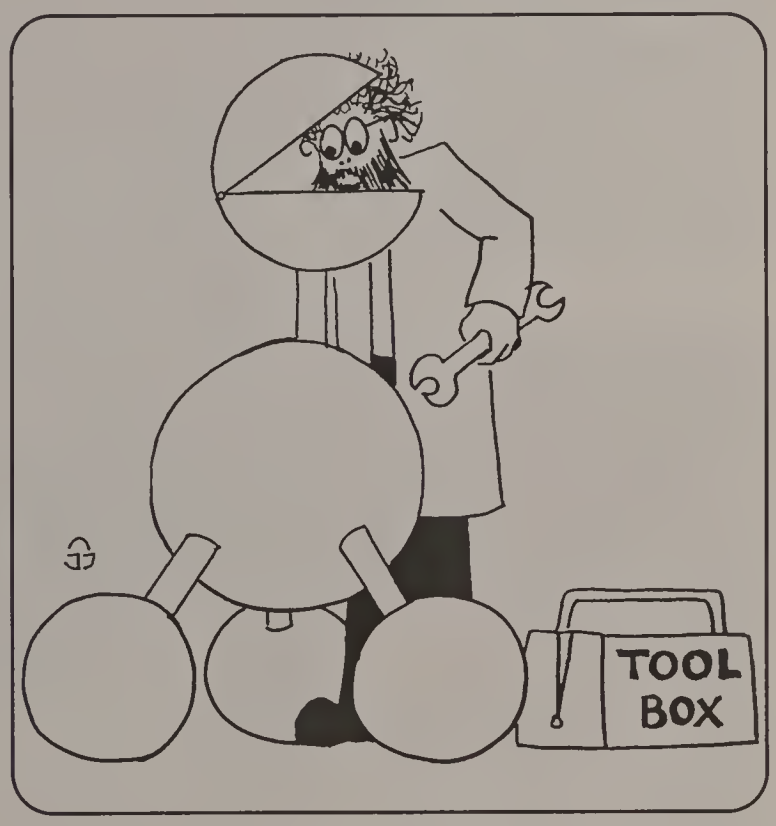
Recommendations for naming fused and bridged ring systems (a comprehensive documentation), a glossary of class names and reactive intermediates based on structure, and a glossary of basic terminology of stereochemistry, three large projects, were all approved for peer review following incorporation of changes agreed upon in Lund.

'Phane nomenclature – Part I', a project that has become notorious for the length of its gestation period, was approved for peer review for the second time. The long delay was due to re-evaluation in response to comments from referees, and extensive revision.

Other projects on the commission's agenda include rationalization of the nomenclature of oxoacids; a comprehensive revision and expansion of stereochemical nomenclature (Section E of the 1979 edition); documentation of the CAS and Beilstein usage of 'indicated (added) hydrogen', and a comparison with the concept of non-detachable hydro prefixes (a subtle and perplexing subject!); and a codification of 'nodal numbering', a system developed for use with 'nodal nomenclature', – a powerful method based on a new principle.

Finally, the commission mapped out a major part of its work for the next few years in the planning of Part II of the revision of the 1979 'Blue Book' general rules. This task has as a central focus the development of a protocol for establishing a 'preferred' name for any organic compound, when one is needed. This is required for many purposes, including legal regulations, patent law, and computerized handling of the interface of structures and nomenclature.

Peter A. S. Smith



Finance Committee meeting in Zürich

The restructured Finance Committee met on 19–20 February 1990 at the Zürich offices of Schwiezerische Bankgesellschaft, the IUPAC banker.

The committee reviewed the Union's investments, received the accounts for 1989, and examined the budget and final allocations for 1990–91. Problems arising for some member countries were considered, following the adoption by Council at the Lund General Assembly last year of the *United Nations industrial statistical yearbook* as the source of national chemical turnover data for computation of the annual subscriptions. The committee received a report on the status of the IUPAC computerized accounting system introduced at the Secretariat from the start of 1990.

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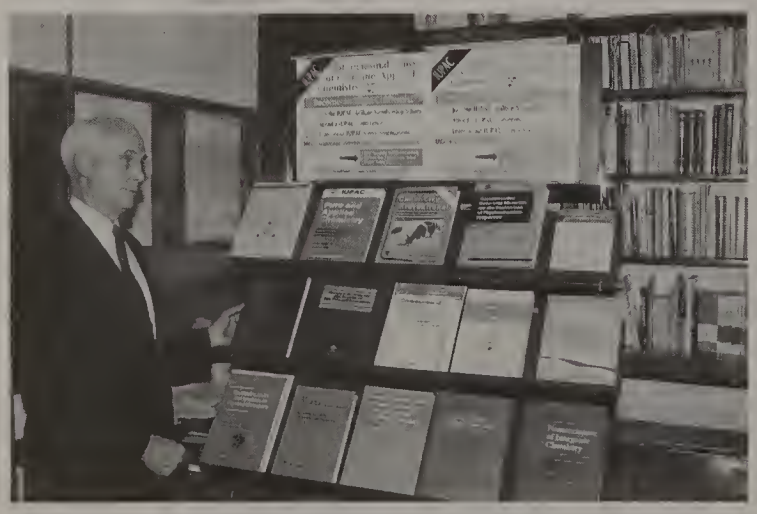
During its meeting at Zürich, the committee paid an evening visit to the head office and research facilities of the MAAG group at Dielsdorf. MAAG, a subsidiary of IUPAC Company Associate Hoffmann-La Roche, was originally (in 1844) involved in the production of dyes, but for the past 100 years it has specialized in agrochemicals (fungicides, herbicides, insect growth regulators).

The restructured Finance Committee: (from left) seated — Prof. J. M. Ward (Chairman, UK), Dr L. C. Krogh (USA), Prof. E. J. Grzywa (Poland), Dr J. Brunner (Switzerland); standing — Prof. A. Björkman (Treasurer, Denmark), Dr W. Fritsche (Observer, FRG).

Publications contract reviewed

At the IUPAC General Assembly held in Lund in August 1989, the Publications Committee reviewed the existing publishing contract of the Union with Blackwell Scientific Publications (Oxford, UK), which had been in operation since the start of 1985.



IUPAC Executive Secretary Dr Mo Williams surveys some recent IUPAC publications on display at the Secretariat in Oxford

The committee was satisfied that the best interests of IUPAC would be served by continuing the collaboration with BSP. The Bureau accepted its recommendation that the contract should be allowed to run on for the years 1990 and 1991 and be augmented in the light of the joint experience over the past 5 years.

Medicinal chemistry

The third meeting of the Section on Medicinal Chemistry was held in New Delhi, India, 3–4 February 1990. It focused on several aspects of the section's core activities.

First, the Working Party on Teaching and Education, in co-operation with the International Union of Pharmacology, will tackle a standard nomenclature for pharmacological receptors as well as standards for reporting on the activities of chiral compounds.

Prof. Camile Wermuth is President of the Section on Medicinal Chemistry. The section met in New Delhi prior to the 17th International Symposium on the Chemistry of Natural Products.

At its meeting, the section finalized a list of topics and authors for the forthcoming monograph entitled *Medicinal chemistry for the 21st century*. So far 24 prominent scientists, including three Nobel laureates, have agreed to contribute.

The section agreed to modify the objectives of the Working Part on Natural Products. Thus, a list of institutes particularly in developing countries which practice natural products chemistry will be

compiled. Concurrently, a list of pharmaceutical companies which undertake natural products screening in selected biological tests would be made. The section intends to facilitate collaboration between members of the respective lists by providing points of contact.

The section intends to investigate the availability of funds for grants for natural product chemists identified in the above list. Successful grantees would be chosen by the Section of Medicinal Chemistry.

A meeting between the section and the Commission on Biotechnology was arranged for July as part of the ongoing interface between these two IUPAC bodies. Furthermore, the section would investigate the possibility of combining aspects of medicinal chemistry with a school on biotechnology to be held in Pushino near Moscow in 1991.

Camile Wermuth

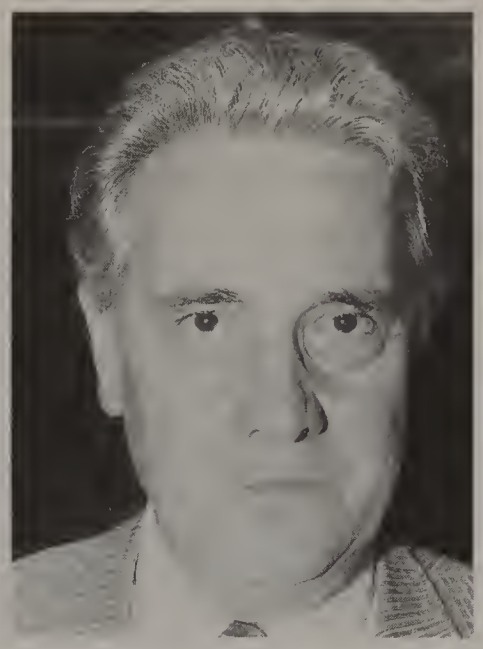
Physical Chemistry Division Committee

The Physical Chemistry Division Committee spent a significant amount of time planning for the future at its meetings at the Lund General Assembly in August 1989.

It established a Working Party on Theoretical Chemistry chaired by R. D. Brown (Australia) and a Working Party on Hot Spots in Physical Chemistry chaired by K. Kuchitsu (Japan). The Steering Committee on Biophysical Chemistry is working on ways to increase the emphasis within the division on the physical chemistry of biological systems. The division is participating in the Ad Hoc Interdivisional Committee on Solid State Chemistry.

At the Lund meeting, G. M. Schneider (FRG) was elected president of the division, R. A. Alberty (USA) was elected vice-president and K. Kuchitsu was elected secretary. Four new commission chairmen were elected: T. Cvitas (Yugoslavia) — Commission on Physicochemical Symbols, Terminology and Units (I.1); P. A. G. O'Hare (USA) — Commission on Thermodynamics (I.2); E. T. Denisov (USSR) — Commission on Chemical Kinetics (I.4) and C. J. H. Schutte (Republic of South Africa) — Commission on Molecular Structure and Spectroscopy (I.5).

The Subcommittee on Plasma Chemistry will be chaired by R. d'Agostino (Italy). The subcommittee's 9th International Symposium on Plasma Chemistry was held at Pugnochiuso, Italy, 5–6 September 1989 following the Lund meeting. S. Rasberry (USA) was appointed Chairman of the Subcommittee on Reference Materials in Chemistry and K. Marsh (USA) will continue to chair the Working Party on Data Compilations in Physical Chemistry.



Prof G. M. Schneider was elected President of the Physical Chemistry Division at Lund.

It is not possible to report here in any detail on the activities of the six commissions of the division, but perhaps a few words can give an impression of their current and proposed activities.

Commission I.1 is working on extensions and revisions of the *Quantities, units, and symbols in physical chemistry* (the Green Book) and is happy to hear from people with suggestions and comments. Appendices will be published in specialized areas.

Commission I.2 is completing a document on 'Standard quantities in chemical thermodynamics: fugacities, activities, and equilibrium constants for pure and mixed phases' and a new project on 'Electrolyte solution data' is being started.

The London Project Centre has just completed a draft of the volume on the thermodynamic properties of fluorine (volume 11). The Commission on Electrochemistry (I.3) has several papers in advanced stages of publication and is discussing future projects on electrocrystallization, energy conversion, and new electrode materials.

The Division Committee discussed ways in which it can contribute to the new mission-oriented projects of IUPAC. Reporting on Commission I.4 provides an opportunity to point out that the Subcommittee on Gas Kinetics, chaired by J. A. Kerr (Switzerland), is working on a major evaluation of kinetic and photochemical data for atmospheric chemistry. Commission I.4 has submitted a report on 'Kinetics of composite reactions in closed and open-flow systems' prepared by J. Villermaux (France).

Commission I.5 has three documents in press in *PAC,* and the summaries of five documents will appear soon in *CI.* The Commission on Colloid and Surface Chemistry including Catalysis (I.6) has initiated new projects on the 'Role of surface and colloid chemistry in environmental protection' and 'Surface chemical problems in the development of advanced materials'.

Robert A. Alberty

PAC Review

Pure and Applied Chemistry (*PAC*) is IUPAC's official journal. It publishes the main invited lectures of symposia sponsored by the Union; the recommendations of its commissions on nomenclature, symbols and units and technical reports on standardization, recommended procedures, collaborative studies and data compilations. Summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports appearing in *PAC* are published in *CI* in the section *Recent Reports*. In this section we take a brief look at the symposia and lectures published in recent issues of *PAC*.

Novel aromatic compounds

The March 1990 issue of *PAC* is devoted to the 6th International Symposium on Novel Aromatic Compounds held in Toyonaka, Osaka, Japan in August 1989. There were five plenary lectures and also invited lectures grouped into four sections: theoretical studies; spectroscopic studies; studies on host–guest chemistry; and organic experiments.

IUPAC affiliate William C. Herndon was one of three chemists from the University of Texas at El Paso, USA, who were authors of a paper on 'Structure–enthalpy relationships in polycyclic cata-condensed aromatic hydrocarbons' in the section on theoretical studies.

The El Paso chemists pointed out, in their paper, that a large fraction (30 out of 62) of the cata-condensed polycyclic benzenoid aromatic hydrocarbons with one to six rings have non-planar pi carbon atom frameworks, with the minimum angle of non-planarity approximately 30°

They predict that, in addition to 17 pairs of enantiomers, four of the non-planar cata-condensed benzenoids with six rings are capable of existing as pairs of twisted diastereoisomers.

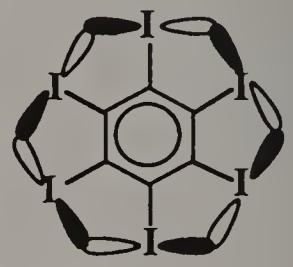
Many of the non-planar benzenoids are thermodynamically more stable than isomeric planar compounds. The MMX molecular mechanics force field provides reasonable estimates of $\triangle H_f°(g)$ and geometric structures for cata-condensed benzenoids, in good agreement with the limited experimental data. AM1 calculations are not useful to determine the $\triangle H_f°(g)$ of these compounds.

A group additivity method that incorporates C–C and C–H bond terms, a resonance energy term and steric parameters can be used to model the MMX and the experimental $\triangle H_f°(g)$ data accurately. Both MMX and the group additivity/resonance energy procedure can also be used for predictive purposes and to estimate resonance energies.

In the section on organic experiments IUPAC affiliate J. C. Martin and L. J. Schaad (Vanderbilt University, Nashville, USA) co-authored a paper on 'Sigma-delocalized aromatic species formed from cyclic arrays of hypervalent main-group element species'.

According to their paper, evidence suggests that the di-cation formed by oxidation of hexaiodobenzene may reasonably be called a sigma-delocalized aromatic species. A variety of experimental results supports the suggestion that two electrons are removed from the sigma-delocalized HOMO of hexaiodobenzene to form the 10-electron (4n+2) aromatic di-cation.

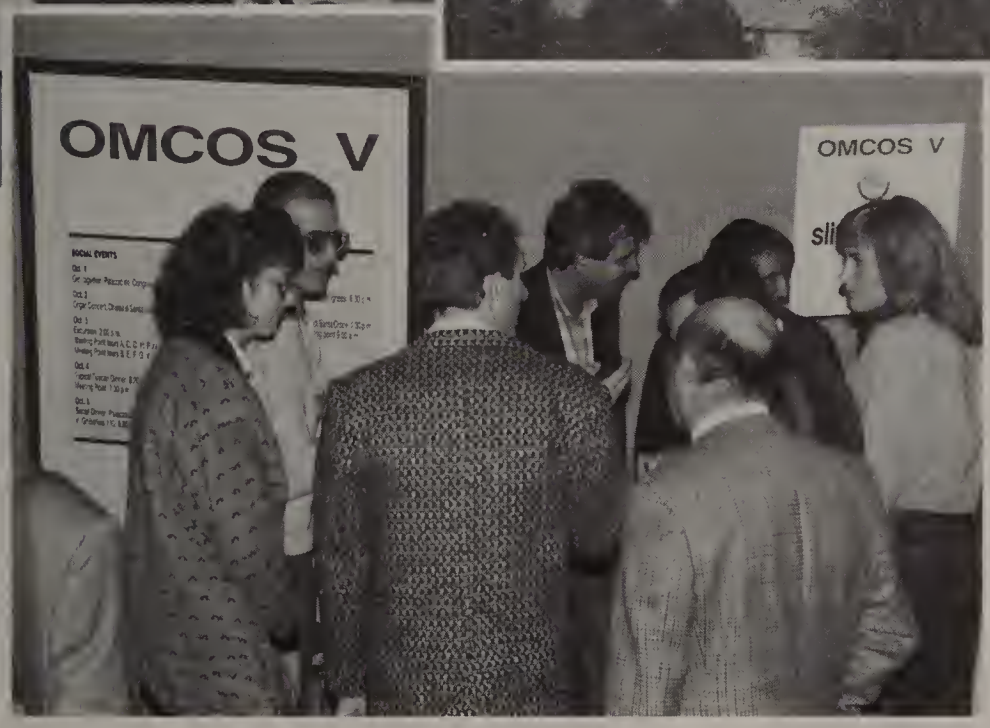
The higher field chemical shift observed for the ^{13}C NMR singlet upon conversion of hexaiodobenzene to the di-cation, an upfield shift of 42.6 p.p.m. is best described, say Martin and Schaad, by the proposed sigma-delocalized ring-current of the circular array of six iodines. Calculation of the graph-theoretical resonance energy for the hexaiodobenzene di-cation, 0.013 $ß_{cc}$ per delocalized sigma electron, provides evidence for sigma-delocalized aromatic stablization for the cyclic array of coplanar overlapped p-orbitals of the six iodines of the di-cation.



The sigma-aromaticity of the di-cation is similar to the pi-aromaticity of the 10-pi-electron species, azulene (0.015 $ß_{cc}$ per electron). The six sigma-delocalized orbitals of the six iodines of the di-cation are arranged similarly to the pi-delocalized orbitals of benzene but are not as widely separated as are those of benzene. This provides lower frequency absorptions of the dark blue solution of the di-cation ditriflate with two peaks in the near infra-red region (985 and 1155 nm). Current evidence supports the suggested 10-electron sigma-delocalized aromatic species, the hexaiodobenzene di-cation.

Organometallic chemistry

The April 1990 issue of *PAC* contains the plenary and invited lectures presented at the 5th International Symposium on Organometallic Chemistry Directed



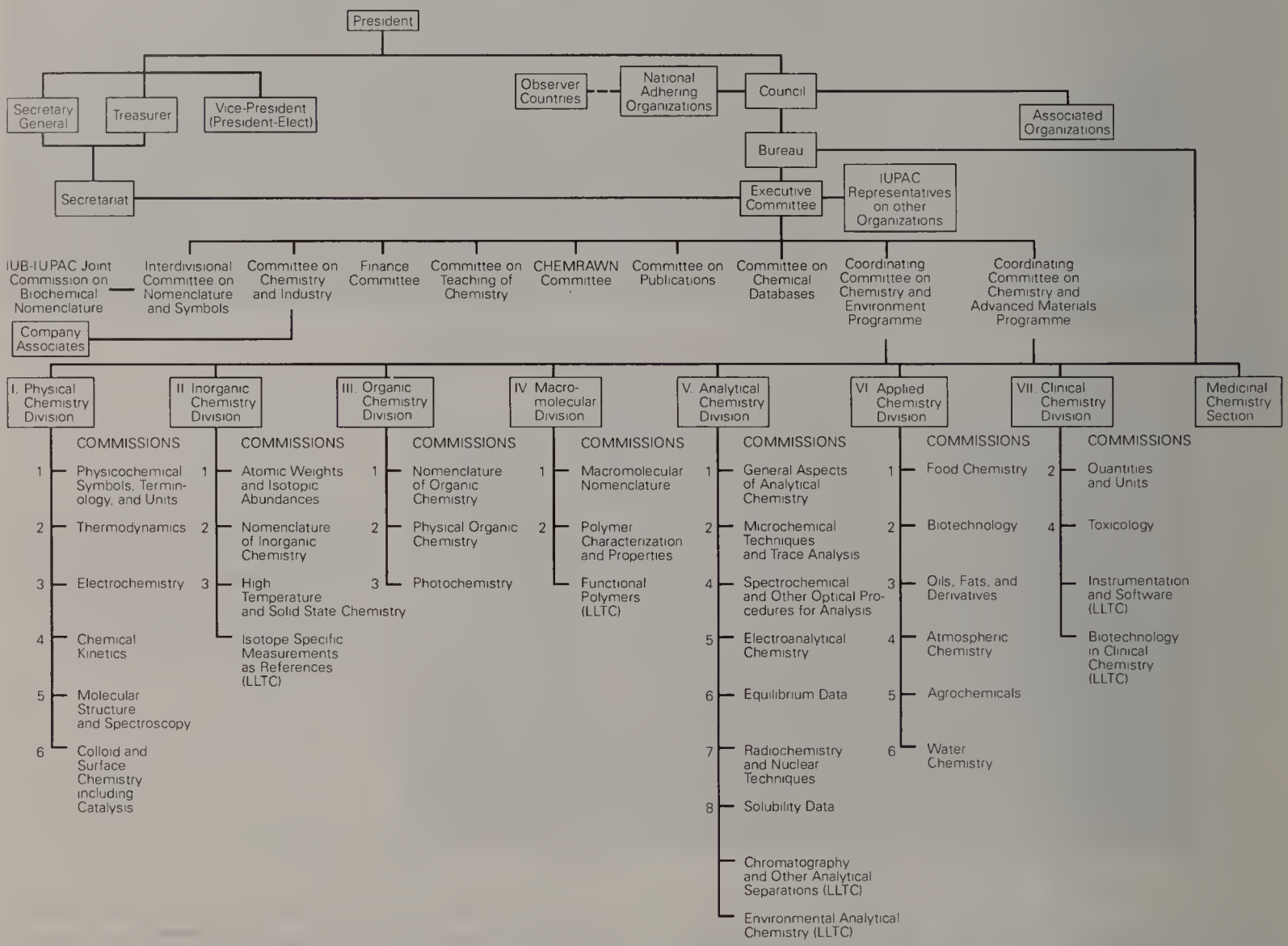
Alfredo Ricci (above left), one of the symposium editors and chairmen, welcomes OMCOS–V participants to Florence (right). Lectures from the symposium appeared in the April issue of *PAC*.

Toward Organic Synthesis (OMCOS-V), held in Florence, Italy, 1–6 October 1989. A report on OMCOS-V and summaries of the plenary lectures appeared on pages 138–141 of the July 1990 issue of *CI*.

The following invited lectures presented at the conference were also published in the above issue of *PAC*: Chromium directed regio- and stereocontrol: a new chapter in aromatic natural product synthesis (D. A. Widdowson *et al.*, UK); New metallation and synthetic applications of isonitriles (Yoshihiko Ito, Japan); Right or left — this is the question: enantioselective catalysis with transition metal compounds (Henri Brunner, FRG); Preparation and some applications of functionalized organo-lithium compounds in organic synthesis (José Barluenga, Spain); Some palladium-catalysed carbon–carbon bond formation reactions (M. Catellani *et al.*, Italy); Asymmetric C–C bond formation with titanium carbohydrate complexes (R. O. Duthaler *et al.*, Switzerland); New organometallic reagents: use of 2-(trimethylsilyl)thiazole in acyclic stereoselective strategies (A. Dondoni, Italy); New applications of organopalladium compounds in organic synthesis (R. C. Larock, USA); Opportunities in homogeneous catalysis (E. Drent, The Netherlands); Regioselective synthetic processes based on the aromatic directed metalation strategy (V. Snieckus, Canada); Alkali salts of 1,3,3-trisubstituted propynes and use of these organometallic compounds in syntheses (P. I. Dem'yanov *et al.*, USSR); New trends in dimetallic synthons (F. Bickelhaupt, The Netherlands); Novel processes for stereoselective organic synthesis (G. A. Molander *et al.*, USA); The palladium-catalysed hydroarylation and hydrovinylation of carbon–carbon multiple bonds (S. Cacchi, Italy); Stereoselective isomerization of acetylenic derivatives as a new methodology in organic synthesis (X. Lu *et al.*, China); Biomimetic catalysts for selective oxidation in organic chemistry (D. Mansuy, France); Carbonyl addition reaction promoted by cerium reagents (T. Imamoto, Japan).

Organization of IUPAC (1989–1991)

The organization chart of IUPAC (1989–1991) published in the new *IUPAC handbook 1989–1991* shows a number of significant changes when compared with the previous chart published on the inside front cover of the *IUPAC handbook 1987–1989.*



Two of the changes shown in the new chart (see above) result from decisions taken at the 34th Council Meeting of IUPAC at Boston, USA, 28–29 August 1987. On the recommendation of the Bureau, Council resolved at its Boston meeting to establish a **Section on Medicinal Chemistry** attached to the Bureau. The initial terms of reference restricted the activity of the section to modelling and perhaps drug design/synthesis, in order to permit the section to demonstrate that it could quickly and successfully complete IUPAC-type project work.

Furthermore, on the recommendation of the Bureau, Council resolved to allow the Commission on Teaching in Clinical Chemistry (VII.3) to continue in existence to the end of 1988 in order to complete its projects before dissolution. Commission VII.3 ceased to exist from the beginning of 1989.

The remaining changes shown in the chart were all approved by Council at its 35th Meeting in Lund, Sweden, 16–17 August 1989 acting on the recommendation of President Yves Jeannin following his Vice-Presidential Critical Assessment of the work of IUPAC bodies (see pages 19–20 of the January 1990 issue of *CI*).

Coordinating committees for two of IUPAC's new mission-oriented programmes now appear on the chart: **Coordinating Committee on Chemistry and Environment Programme** and **Coordinating Committee on Chemistry and Advanced Material's Programme.** A report on the Chemistry and Environment Programme appeared in the previous issue of *CI* (pages 132–4, July 1990).

Council approved the formation of a **Limited Life Time Commission (LLTC) on Isotope Specific Measurements as References** for Toxic/Bioessential Element Assays jointly between the Inorganic Chemistry Division (II) and the Clinical Chemistry Division (VII) as part of the Chemistry and the Environment Programme (see Figure on page 11 of the January 1990 issue of *CI*).

Council also approved: an **LLTC on Functional Polymers** in the Macromolecular Division (IV) as part of the Chemistry and Advanced Materials Programme; two **LLTCs** in the Analytical Chemistry Division (V), one on **Environmental Analytical Chemistry** as part of the Chemistry and the Environment Programme and the other on **Chromatography and Other Analytical Separations**; two LLTCs in Division VII on **Instrumentation and Software** (in clinical chemistry) and on **Biotechnology in Clinical Chemistry.**

Division V dissolved its Commissions on Analytical Reactions, Reagents and Separations (V.1) and on Analytical Nomenclature (V.3) and replaced them by a single **Commission on General Aspects of Analytical Chemistry** (V.1), covering largely the same area as the former two bodies. Otherwise the Council authorized the continuation of all existing IUPAC commissions for a further two years.

Solubility data series

The IUPAC *Solubility data series* contains critically evaluated solubility data for physical and biological systems. Volumes 39 to 44 have recently been published.

Cumulative index

This *Cumulative index,* which is Volume 39 of the *Solubility data series,* covers Volumes 20 to 38 of the series.

The first *Cumulative index,* Volume 19, published in 1985, covered the first 18 volumes in the series. Both indexes have been produced in the hope that they will enable workers to locate data both for the system of interest and closely related systems without the necessity of consulting the indexes of individual volumes.

Further cumulative indexes will be issued, each covering volumes published in the preceding 4 or 5 years. Publication of a *Comprehensive cumulative index* is planned at the end of the series of some 100 volumes. The editor would welcome comments on any aspect of the first and second cumulative indexes.

The index consists of three sections: a system index, an author index and a Chemical Abstracts Registry Number index. The system index is arranged in a similar manner to the system indexes in individual volumes. Pages preceded by E refer to evaluation text wheras those not preceded by E refer to compiled tables.

In general, compounds are listed as in *Chemical Abstracts:* for example, toluene is listed as benzene, methyl 1-; and dimethysulfoxide is listed as methane, sulfinylbis-. Gas liquid systems are listed by solvent. Solid–liquid systems are listed under the solid but not usually under the solvent as well. Liquid–liquid systems appear under the non-aqueous component but not under water.

Cumulative index, *Volume 39 of the* Solubility data series *is edited by Colin Young and published by Pergamon Press, Oxford, UK, 1989. 382 pp. ISBN 0 08 037205 8. Price USD 85.00.*

Halides, oxyhalides, and salts of halogen complex ions containing elements of groups four and five

Halides, oxyhalides, and salts of halogen complex ions containing elements of groups four and five (titanium, zirconium, hafnium, vanadium, niobium and tantalum) is Volume 40 of the series.

The volume covers all relevant data on the solubility of the title compounds of Ti(III, IV), Zr(IV), Hf(IV), V(II, III, IV, V), Nb(V) and Ta(V) as published in the literature up to mid-1988. The solubilities of these substances in aqueous, non-aqueous, binary and multicomponent systems are compiled. Critical evaluations are presented for a number of systems.

The volume will be of interest to hydrometallurgists, inorganic and analytical chemists, and to all who work with the chemistry and technology of groups four and five metals.

The volume contains a memorial and publication list of Steven Kertes, late Editor-in-Chief of the series.

Volume 40 of the Solubility data series *is edited by J. Hala, S. A. Johnson and H. L. Clever and published by Pergamon Press, Oxford, UK, 1989. 364 pp. ISBN 0 08 040198 8. Price USD 85.00.*

Alkaline earth metal perchlorates

Alkaline earth metal perchlorates, edited by Chee-Yan Chan, Kean H. Khoo and Ivan N. Pepeshkov, is Volume 41 of the *Solubility data series.*

A substantial amount of solubility data for the alkaline earth metal perchlorates (beryllium, magnesium, strontium and barium), in water, non-aqueous solvents and multicomponent systems, has not been readily available to scientists outside the USSR in the past because the data were

published in journals that are not easily accessible.

This volume addresses this problem through critical evaluations of relevant solubility data compiled from all recognized publications, many of which are of Soviet origin. Literature coverage comprises about 140 references, and is complete up to the end of 1987. The original data, especially those from Soviet sources, have been recalculated to conform to SI units. Numerous phase diagrams have also been included to assist the reader in identifying various equilibria. As in all volumes of the series, system, formula, CAS Registry Number and author indexes are included.

All of the alkaline earth metal perchlorates form several hydrates and ammines, except perhaps beryllium perchlorate for which only one hydrate, $Be(ClO_4)_2.4H_2O$ has been reported. They have been used as drying agents, as well as ammonia absorbents, and this usage seems to have been their main focus of commercial interest in the past.

Jack Lorimer, chairman of the Commission on Solubility Data and editor-in-chief of the *Solubility data series*.

Their hygroscopic nature precludes their general use in the manufacture of explosive and rocket propellants, unlike ammonium and potassium perchlorates which do not form hydrates. Their use as catalysts in the polymerization of styrene and as catalytic curing agents in a treatment process for textiles have also been reported.

Recent patented literature reports many other new and varied uses. Among these are their uses as heat stabilizers and anti-oxidants for synthetic rubbers and PVC, as discoloration prevention agents for polystyrene, in the treatment of polyimide membranes for water desalination and in compounds with polyethylene oxide for use as electrolytes in solid-state batteries.

The preparation of the alkaline earth metal perchlorates, with the exception of beryllium perchlorate, was first reported by Serullas in 1831 and the preparation of beryllium perchlorate was first reported in 1873 by Atterberg and de Marignac. However, reliable solubility data for these perchlorates in water and other solvents were not available before 1923.

All of the alkaline earth metal perchlorates are very soluble in water and in alcohols. Many of the data compiled in this volume pertain to aqueous multicomponent systems of these perchlorates and it appears that the primary objective of the authors of the original measurements was to obtain solubility data for the construction of phase diagrams and the characterization of the solid phases in equilibrium with the saturated solutions.

The volume should be of value to analytical and inorganic chemists with interests in solution chemistry and to electrochemists, in universities and research institutes as well as in industry. Every major library should have a copy for reference purposes.

Volume 41 of the Solubility data series *is edited by Chee-Yan Chan, Kean H. Khoo and Ivan N. Lepeshkov and published by Pergamon Press, Oxford, UK, 1989 xxi + 280 pp. ISBN 0 08 040198 8. Price USD 85.00*

Hydrogen halides in non-aqueous solvents

Hydrogen halides in non-aqueous solvents is Volume 42 in the *Solubility data series*. It contains evaluated data for the solubility of hydrogen fluoride, hydrogen chloride, hydrogen bromide and hydrogen iodide in non-aqueous solvents.

Information on about 400 systems is included. Hydrogen halides take part, either as reactants or products, in many reactions of organic compounds. Evaluated solubility data for these gases are required for the prediction of the course and mechanism of such reactions. The volume will therefore be of special interest to organic chemists and to chemical engineers concerned with syntheses involving halogen compounds in non-aqueous media.

There are few measurements of the solubility of hydrogen fluoride in non-aqueous solvents. Mole fraction solubilities of each of the other gases show wide divergences from solvent to solvent under the same conditions of temperature and pressure. Values at a partial pressure of gas of 101.3 kPa in organic solvents containing oxygen are often greater than in water. In many cases there are distinct non-linear variations of mole fraction solubility with change of partial pressure of gas at pressures less than 101.3 kPa. This must be borne in mind when attempts are made to predict solubilities at finite pressures from limiting values of Henry's law constants.

Equations relating mole fraction solubility at constant pressure with temperature were derived when there was appropriate experimental data on which to base these equations.

Peter Fogg is one of the editors of *Hydrogen halides in non-aqueous solvents.*

Contents include: the solubility of gases in liquids; hydrogen fluoride in non-aqueous solvents; hydrogen chloride in non-aqueous solvents (alkanes; mixtures of heptanes and other solvents; miscellaneous hydrocarbons; aromatic hydrocarbons; alkanols; halogenated alkanols; alkenols and alkynols; alkanediols; aromatic and alicyclic alcohols; ethers and miscellaneous solvents containing carbon, hydrogen and oxygen; aliphatic carboxylic acids; esters of carboxylic and carbonic acids; halogenated alkanes and halogenated alkenes, halogenated aromatic compounds; nitrogen compounds; sulfur compounds; boron compounds; phosphorus compounds; silicon compounds; tetrachlorostannane and titanium chloride); hydrogen bromine in non-aqueous solvents (alkanes; aromatic hydrocarbons; alcohols, ethers and carboxylic acids; haloalkanes and halobenzenes; nitrogen compounds; sulfur compounds and boron compounds); hydrogen iodide in non-aqueous solvents (alcohols, ethers and carboxylic acids; alkyl halides; sulfur compounds and boron compounds).

Volume 42 of the Solubility data series *is edited by P. G. T. Fogg and W. Gerrard and published by Pergamon Press, Oxford, UK, 1989. 496 pp. ISBN 0 08 0239250 (H). Price USD 85.00*

Discounts for IUPAC members and affiliates

Members of IUPAC commissions and committess and IUPAC affiliates may purchase volumes of the *Solubility data series* at reduced prices:

- USD 35.00 for IUPAC members whose names appear in the *IUPAC handbook* or for any individual whose institution has a library subscription;
- USD 63.75 (that is, a 25% reduction on published price) for IUPAC affiliate members.

Place your orders directly with your nearest Pergamon agency, or use the Pergamon Hotline Service in Oxford, Tel: +44 (865) 64881.

Carbon monoxide

Carbon monoxide, which is Volume 43 of the *Solubility data series,* contains tabulated collections and critical evaluations of original data for the solubility of carbon monoxide in a variety of liquid solvents. Most of these solubilities were measured at temperatures around ambient, and for partial pressures of carbon monoxide around 101.3 kPa. Some data, however, are for temperatures as low as 93 K and as high as 573 K, and for pressures up to 101 MPa.

Within the volume, material is arranged according to solvent class, with solubility data for low pressures and high pressures collected together. The solvents include water, aqueous and non-aqueous salt solutions, a variety of hydrocarbons, a variety of oxygen-containing, halogen-containing, sulfur-containing, and nitrogen-containing organic compounds, and also some biological fluids with which carbon monoxide has an important interaction.

The data were gathered from a search of the world's chemical literature through to the end of 1988, and make up a unique and valuable historical survey of the solubility of carbon monoxide. Their publication is timely in view of current concern about carbon monoxide as an atmospheric pollutant and in view of the role which carbon monoxide is likely to play in the future, as chemical feedstocks may have to change in response to supply and demand patterns, and as alternative energy sources are developed, especially coal gasification technology. For all these applications, and for numerous others, this volume of well documented and critically evaluated gas solubility data will be of tremendous benefit.

The publication of the SDS volume on *Carbon monoxide* is timely in view of current concern about carbon monoxide as an atmospheric pollutant.

Solubility data series.

Contents include carbon monoxide solubilities in water; sea-water; salt solutions (aqueous); salt solutions (non-aqueous); organic solvents and water; saturated and unsaturated hydrocarbons; cyclic hydrocarbons; aromatic hydrocarbons; alcohols; ketones, acids, esters, ethers; organic compounds containing halogen; organic compounds containing sulfur; organic compounds containing nitrogen; biological fluids; miscellaneous fluids.

Volume 43 of the Solubility data series *is edited by R. W. Cargill and published by Pergamon Press, Oxford, UK, 1990. xxi + 330 pp. ISBN 0 08 0307337 (H). Price US 85.00*

Copper, silver and gold halates

Volume 44 of the *Solubility data series* contains compiled and critically evaluated solubility data for the halates of the group 11 metals. This is the third volume in the series of metal halates: Volume 14 was published in 1983 and contains solubility data for the alkaline earth metal halates, and Volume 30 was published in 1987 and contains solubility data for alkali metal halates, ammonium iodate and iodic acid.

Included in Volume 44 are solubility data for the five compounds, copper chlorate and iodate, and silver chlorate, bromate and iodate. The evaluators and compilers were not able to locate published data for gold halates and for copper bromate.

The volume contains all available solubility data for the group 11 metal halates in both aqueous, mixed and non-aqueous solvents. Where there are sufficient experimental solubility data, the data are critically evaluated and recommended solubilities tabulated along with thermodynamic equilibrium constants.

With the exception of chlorates, the group 11 metal halates are sparingly soluble compounds, and have an important place in the theoretical treatment of electrolyte solutions, for example, confirmation of the Debye-Hückel equations and treatments of complex equilibria involving carboxylic acids and amino acids. More practical applications of the chemical properties of the group 11 metal halates include their use as oxidizing agents and mordants in the dyeing and printing of textiles and leather.

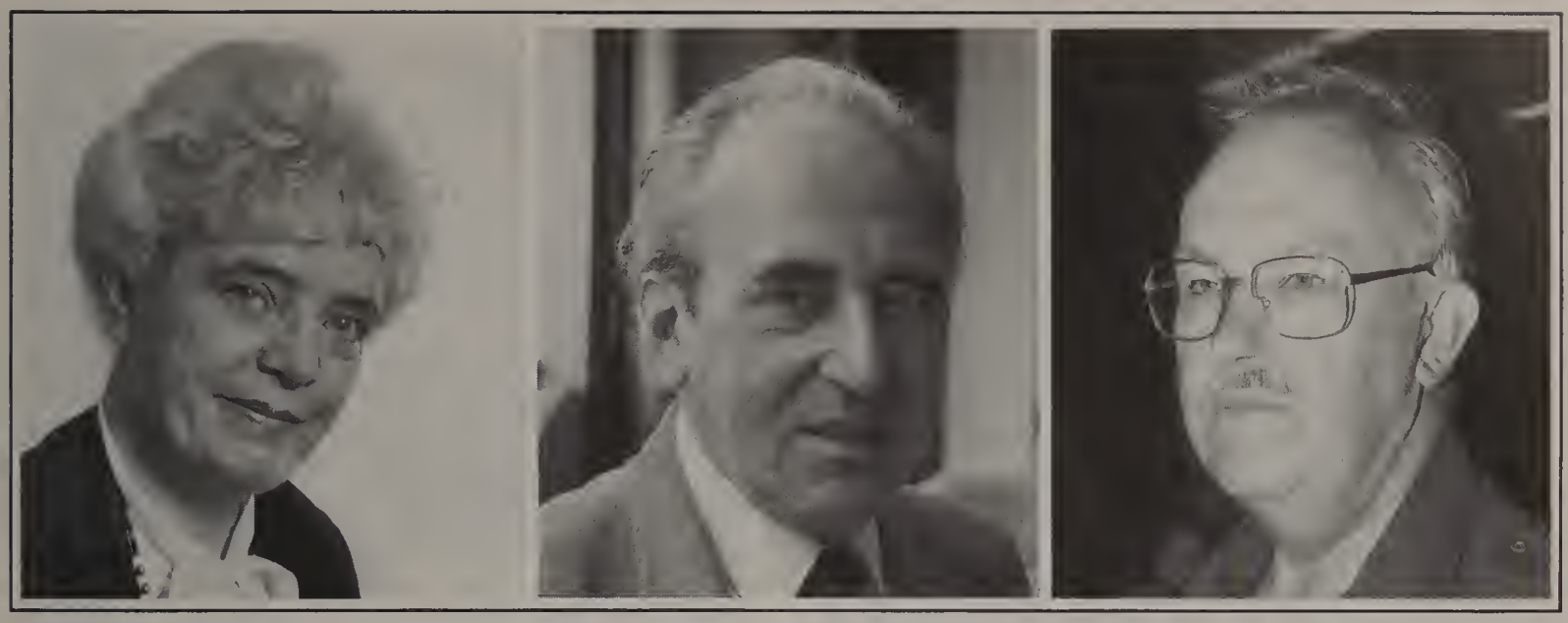
Volume 44 of the Solubility data series *is edited by H. Miyamoto, E. M. Woolley and M. Salomon and published by Pergamon Press, Oxford, UK, 1990. ISBN 0 08 029208 9. Price USD 85.00*

Publications

Frontiers of macromolecular science

Frontiers of macromolecular science is a collection of plenary, invited and session lectures delivered at the IUPAC-sponsored 32nd International Symposium on Macromolecules (MACRO 88) held in Kyoto, Japan, 1–5 August 1988.

MACRO 88 was a multi-topic symposium covering a wide range of research fields in macromolecular science. In the framework of the symposium programme, polymers of specific functions and high performance were emphasized in addition to the fundamental chemistry and physics of macromolecules. This was because the organizers recognized that macromolecular science and engineering play a leading part in materials science, which is of vital importance as the basis of the so-called 'advanced technologies'. As a result, a large number of scientists from industry participated in the symposium.



Contributors to *Frontiers of macromolecular science* (from left): Profs M.T. Rätzsch, W. Heitz and A.D. Jenkins.

The plenary lectures published in these proceedings are: Free radical ring-opening polymerization (W.J. Bailey, USA); Structure of homopolymers, block copolymers and polymer blends as revealed by neutron scattering (E.W. Fischer, FRG); and Future prospects for the polymer industry (Y. Ito, Japan).

The remaining lectures are grouped into the following six sections:

1. Polymerization chemistry:
2. Synthesis of new polymers and polymer reactions:
3. Structure and properties of polymers:
4. High performance polymers;
5. Functional polymers; and
6. Bio-related polymers.

They include lectures on: 'Functional polymers on the basis of 2-oxazolines' by Past-President of the IUPAC Macromolecular Division, Prof. T. Saegusa and his colleague Prof. Y. Chujo (Japan); 'Reactivity and structure in radical polymerization' by Division Secretary, Prof. A.D. Jenkins (UK); 'Telechelic oligomers' by Division President, Prof. W. Heitz (FRG); and 'Polydispersity in thermodynamic and kinetic considerations' by Division Member Prof. M.T. Rätzsch and her colleague Prof. H. Kehlen (GDR).

Frontiers of macromolecular science *is edited by T. Saegusa, T. Higashimura and A. Abe and published by Blackwell Scientific Publications Ltd, Oxford, UK, 1989, xi + 595 pp. ISBN 0 632 02417 8. Price GBP 72.00/USD 121.50. Affiliate members discount price GBP 54.00/USD 91.00.*

Acid–base dissociation constants

Acid–base dissociation constants in dipolar aprotic solvents is Volume 35 in the *Chemical data series*. The data were compiled by Kosuke Izutzu who is Professor of Analytical Chemistry at Shinshu University, Japan and National Representative for Japan on the Commission on Electroanalytical Chemistry.

The book contains tables of data on the dissociation constants (pK_a values) of many acids and conjugate acids of bases in twelve of the most common dipolar aprotic solvents. Autoprotolysis constants are also included. Each pK_a value is accompanied by information on and references to the method of determination, the standard pK_a system to which it has been referred, the original literature, and the data for homoconjugation and other reactions. Efforts have been made to enable the mutual comparison of pK_a values.

The pK_a values are tabulated in 12 sections according to the following solvents: acetone; acetonitrile; *N,N*-dimethylacetamide; *N,N*-dimethylformamide; dimethyl sulfoxide; hexamethylphosphoric triamide; isobutyl methyl ketone; 1-methyl-2-pyrrolidinone; nitromethane; propylene carbonate; pyridine; and sulfolane. There is also an introduction by K. Izutsu and, at the end of the book, a list of compiled acids and bases.

Acid-base dissociation constants in dipolar aprotic solvents *edited by Kosuke Izutsu is published by Blackwell Scientific Publications Ltd, Oxford, UK, 1990. ISBN 0 632 02875 0. Price GBP 22.00/USD 37.50. Affiliate Discount Price GBP 16.50/USD 28.00*

Environmental health criteria

There are now 86 titles in the *Environmental health criteria series*. The series is published under the joint sponsorship of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO) and the World Health Organization (WHO).

It provides an authoritative assessment of what is known about the effects of chemical substances and a number of physical factors on human health and

on the quality of the environment. It furnishes the scientific information on which national health and other authorities can base suitable control measures where these are needed, and it gives guidelines for setting exposure limits consistent with the protection of human health in the general environment and in the workplace.

Where the substances considered occur in nature (as lead and titanium, for instance), the natural exposure is taken into account. Inevitably, however, the stress is on exposure to such substances during and after manufacture and as wastes and on entirely man-made products (chemicals for industrial use, pesticides and lasers, for example).

Each volume is concerned with a single substance or group of substances, selected from an internationally agreed list of priorities. Drafts are prepared by individual experts or national institutions and are then subjected to extensive revision by one or more international groups of experts in order to ensure that they are as accurate and comprehensive as possible.

The series also comprises a number of volumes describing the principles and methods that are applied in environmental investigation; those published so far cover toxicity testing, the conduct of studies in environmental epidemiology, and exposure monitoring in relation to pregnancy.

The volumes that deal with chemical substances are for the most part the outcome of work performed by the International Programme on Chemical Safety (IPCS); this is a joint venture of UNEP, ILO and WHO. Those that concern sources of non-ionizing radiation are prepared jointly by the International Radiation Protection Association (IRPA) and WHO, with funding from UNEP.

Publications in the *Environmental health criteria series* deal with the effects on human health and the environment of exposure to individual chemical compounds or groups of compounds (red covers). The series also includes a number of publications dealing with the methodology of data interpretation and risk assessment (yellow covers).

The *Environmental health criteria series* deals with the effects on human health and the environment of exposure to individual chemical compounds or groups of compounds. (*Photo courtesy OXFAM.*)

Reports nos 1–78

Titles of reports nos 1–63 were listed on page 43 of the March 1988 issue of *CI* and nos 64–77 on page 195 of the September 1989 issue of *CI*. Report no. 78 entitled *Dithiocarbamate pesticides, ethylenethiourea, and propylenethiourea: a general introduction* was reviewed on page 195 of the September 1989 issue of *CI*.

The prices range from CHF 6.00 to CHF 28.00. They are available from national WHO sales agents or in case of difficulty from WHO, Distribution and Sales, 1211 Geneva 27, Switzerland.

Non-ionizing radiation protection

Report no. 25, Second edition. Edited by Michael J. Suess and Deirdre A. Benwell-Morison, published by WHO, 1989. 346 pp. ISBN 92 4 890 11165. CHF 43.00. Order No. 131 0025.

One of the newer environmental hazards is non-ionizing radiation (NIR). Except for the narrow spectrum of visible radiation NIR cannot be detected by any of the human senses unless its intensity becomes so great that it is felt as heat. In industry, engineering, telecommunications, medicine, research, entertainment, education and the home there has been a remarkable growth in the number of devices that emit NIR.

Prevention of effects from NIR and its control are a public health matter. The second edition of Report No. 25 *Non-ionizing radiation protection* is aimed at scientists, engineers, physicians and community leaders concerned with and responsible for protection against NIR. The first edition, published in 1982, was the first comprehensive publication covering in one volume the whole range of NIR. This second edition takes into account new research and experience gained in NIR protection since the completion of the first edition.

Dichlorvos

Report no. 79, published by WHO, 1989. 157 pp. ISBN 92 4 154279 9. CHF 16.00/USD 12.80. Order No. 1160079.

Dichlorvos is a contact and stomach insecticide used world-wide to control insects on crops and domestic animals. The compound is also used as an insecticide in houses and other buildings and for insect control in aircraft.

This book evaluates the effects on man and the environment associated with the widespread use of dichlorvos. Noting that exposure via contaminated food and drinking-water is negligible, the book concentrates on health risks in occupational conditions and among residents in houses or buildings using dichlorvos as an insecticide,

primarily in the form of sprays or slow-release strips. Risks to animal species and man are evaluated on the basis of extensive research conducted in experimental animals and *in-vitro* test systems.

Concerning environmental hazards, the book concludes that, with the exception of conditions caused by gross spillage, the recommended use of dichlorvos as an insecticide does not constitute an acute or long-term hazard for aquatic or terrestrial organisms. The high toxicity for birds and bees necessitates caution in the use and handling of dichlorvos where these species might be exposed.

Pyrrolizidine alkaloids

Report no. 80, published by WHO, 1988. 345 pp., ISBN 92 4 154280 2. CHF 34.00/USD 27.20. Order No. 1160080.

This book alerts the medical and public health professions to the severe risks of morbidity and mortality posed by human consumption of plants, including cereals and herbal medicines, containing pyrrolizidine alkaloids.

Citing well over 500 published studies, the book draws together the evidence documenting acute and often fatal organ damage arising from both accidental consumption via contaminated staple crops and the deliberate consumption, in developed and developing countries alike, of medicinal herbs containing these alkaloids. Risks to farm animals are also fully documented.

The book opens with an overview of the problem, stressing the need to heighten awareness of the extent of human poisoning and the steps needed to prevent it. The most extensive sections consider effects on animals and man. Data from clinical studies and case reports are used to detail the clinical and pathological features of veno-occlusive disease in children and adults, the link between intoxication with pyrrolizidine alkaloids and the development of cirrhosis, and the relationship between dose level and toxic effects. The book concludes with 70 pages of tables listing plant sources of these alkaloids.

Vanadium

Report no 81, published by WHO, 1988. 170 pp., ISBN 92 4 154281 0. CHF 19.00/USD 15.20. Order No. 1160081.

Vanadium is a rare element used in ferrous metallurgy as an alloy additive in various types of steel. Vanadium is also used in non-ferrous metals important for the atomic energy industry, aircraft construction, and space technology, and as a catalyst in the chemical production of sulfuric acid and plastics.

This book evaluates over 450 studies in an effort to clarify the risks to human health and the environment posed by the discharge of vanadium during production, use and disposal. Environmental pollution is noted to be greatest in the vicinity of power- and heat-producing plants using fossil fuels.

Studies indicating possible beneficial effects of various vanadium-containing therapeutic diets are also critically reviewed. The most extensive sections evaluate investigations of toxic effects in experimental animals and in man, including the results of therapeutic exposures, controlled studies, and case reports of occupational poisoning.

Although a variety of physiological and biochemical processes have been found to be vanadium-sensitive, the book concludes that all studies reporting an association between vanadium and disease suffer from serious methodological flaws. The need for further research is stressed.

Cypermethrin

Report no. 82, published by WHO, 1989. 154 pp., ISBN 92 4 154282 9. CHF 16.00/USD 12.80. Order No. 1160082.

Cypermethrin is a highly active synthetic pyrethroid insecticide effective against a wide range of pests in agriculture, public health, and animal husbandry. This book evaluates the extent of environmental and health hazards posed by cypermethrin, which has been used extensively throughout the world for more than a decade.

Evaluations are based on the considerable number of studies investigating effects on reproduction, embryo-toxicity, teratogenicity, mutagenicity, and carcinogenicity as well as behaviour in the environment and effects on a number of animal and plant species. Studies of the mechanisms of toxicity, particularly concerning effects on the nervous system, are also critically reviewed.

Concerning environmental hazards, the book cites evidence for the rapid biological degradation of cypermethrin, concluding that, when applied at recommended rates, the levels of cypermethrin and its degradation products in soil and surface waters are very low.

Studies of toxic effects in man indicate that this insecticide is unlikely to present a health hazard through either occupational exposure or exposure of the general population via residues in food and non-food commodities.

DDT and its derivatives: environmental aspects

Report no. 83, published by WHO, 1989. 98 pp., ISBN 91 4 154283 7. CHF 13.00/USD 10.40. Order No. 1160083.

Report no. 83 evaluates the effects of DDT and its metabolites on the reproduction, growth, and

survival of populations of organisms in the environment. Adopting an exotoxicological approach, the report considers only those studies that have investigated the toxic effects of DDT at environmental levels likely to arise from recommended uses. Both immediate toxicity and long-term sub-lethal effects are considered in an effort to profile the full range of ecological hazards posed by DDT.

The opening sections summarize properties of DDT and its metabolites that help explain their resistance to degradation, their widespread persistence in the environment, and their high potential for bio-accumulation. The most extensive sections cite the numerous controlled laboratory experiments that have documented the direct toxicity and long-term sub-lethal effects of DDT and its metabolites on micro-organisms, aquatic organisms, and terrestrial ecosystems, including especially detailed information on the lowered reproductive rate of birds. On the basis of this review, the book concludes that DDT and its metabolites should be regarded as a major hazard to the environment.

2,4-Dichlorophenoxyacetic acid (2,4-D): environmental aspects

Report no. 84, published by WHO, 1989. 92 pp., ISBN 92 4 154284 5. CHF 12.00/USD 9.60. Order No. 1160084.

This book appraises the risks to organisms and ecological systems posed by the use of 2,4-dichlorophenoxyacetic acid (2,4-D), a selective herbicide which kills broadleaved plants but not grasses or conifers. Evaluation is restricted to studies conducted at exposures that could be expected in the field.

The opening sections underscore the importance of the physio-chemical properties and formulation of 2,4-D on its behaviour in environmental compartments. Against this background, separate sections are then devoted to the evaluation of risks to micro-organisms, aquatic organisms, and terrestrial organisms.

Numerous tables are used to summarize the large number of studies indicating toxicity to different species, no-observed-effect levels in different species, and variations in the toxicity of different formulations. The final section considers data on ecological effects from field applications.

On the basis of the evidence reviewed, the book concludes that, used under field conditions and at recommended rates, 2,4-D does not appear to produce direct toxic effects on any animal species.

Lead: environmental aspects

Report no. 85, published by WHO, 1989. 106 pp., ISBN 92 4 154285 3. CHF 13.00/USD 10.40. Order No. 1160085.

Report no. 85 evaluates the effects on the environment of lead pollution arising from the smelting and refining of lead, the burning of petroleum fuels containing lead additives, the burning of coal and oil, and the ingestion of lead shot by birds.

In view of the difficulty of extrapolating from laboratory studies of lead to effects on ecosystems, the book alerts readers to the many factors that influence variations in the bio-availability and accumulation of lead, the degree of lead deposition in the environment and the resulting contamination, and the varying sensitivity of different populations at different life stages.

A section concerned with lead uptake, loss, and accumulation evaluates the results of controlled experimental studies of model ecosystems, aquatic organisms, and terrestrial organisms, and reviews data on field accumulation near highways and urban areas, in industrially polluted environments, and following the ingestion of lead shot by birds.

The most extensive sections provide separate evaluations of the toxicity of lead salts and organic lead to micro-organisms, aquatic organisms, and terrestrial organisms.

Mercury: environmental aspects

Report no. 86, published by WHO, 1989. 115 pp., ISBN 92 4 154286 1. CHF 14.00/USD 11.20. Order No. 1160086.

This report evaluates the effects of mercury on populations of organisms in the environment. Both natural sources of mercury and sources associated with mining and the burning of fossil fuels are considered. Emphasis is placed on the important of understanding the many environmental variables that affect the uptake and toxicity of mercury, the numerous factors that influence the susceptibility of

Mercury: environmental aspects **emphasizes the importance of understanding the many environmental variables that affect the uptake and toxicity of mercury. (*Photo courtesy UNESCO/Jack Ling.*)**

different organisms, and the great variations in the physico-chemical properites and environmental behaviour exhibited by different species of mercury. Studies are also evaluated on the basis of whether the doses and exposure routes used are compatible with likely conditions in the field.

The most extensive sections present illustrative examples of research into the toxic and sub-lethal effects of inorganic and organic mercury on micro-organisms, aquatic organisms, and terrestrial organisms. For all species considered, mercury is noted to be most hazardous in its methyl form. An evaluation of the effects of mercury in the field concentrates on the effects on ecosystems following sea pollution in Japan and the use of organomercury fungicides as seed dressings in Europe.

Translations of IUPAC publications

The *Abbreviated list of quantities, units and symbols in physical chemistry* has been published as a joint Russian/English booklet by the Soviet Vinity Publishing Company. The booklet was translated by Dr Igor Khudyakov and colleagues at the Institute of Chemical Physics, Moscow. They have also translated the 'Glossary of terms used in photochemistry' (*PAC,* Vol. 60, p. 1055, 1988).

Prof G. B. Bokij and Dr N. A. Golubkova, respectively chairman and scientific secretary of the Commission on IUPAC Nomenclature of the National Committee of Soviet Chemists have translated and published a popular book in Russian entitled *Introduction to IUPAC nomenclature.*

A Dutch translation by F. C. Alderweireldt, H. J. T. Bos, L. Maat and D. Tavernier of Sections A and B of the 1979 edition of the 'Blue Book' *Nomenclature of organic chemistry* was published by KNCV/ Vlaamse Chemische in 1987 (ISBN 90-71446-02-6).

A Catalan version of Sections A, B and C of the 1979 edition of the 'Blue Book' *Nomenclature of organic chemistry* was published in 1989 by Consell Superior D'Investigacions Cientifiques, Institut D'Estudis Catalans, Barcelona (ISBN 84-7283-132-9).

Conferences

Polymer materials *Melbourne Australia* 10–15 February 1991

IUPAC SPONSORED

The International Symposium on Polymer Materials: Preparation, Characterization and Properties (POLYMER 91) will be held on the campus of Monash University situated about 20 km from Melbourne city centre.

The symposium will focus on polymer research and technology and polymer materials. New polymer materials are essential for innovation in many technologies, and their development depends upon research into their preparation, characterization and properties.

POLYMER 91 will give participants an insight into future directions in polymer science around the world. The meeting will provide an opportunity for overseas scientists to learn at first hand of the many facets of polymer science and technology in Australia, while Australian scientists will have the opportunity to present their work to a wide audience and to make contacts with leading polymer scientists and engineers.

The scientific programme will include invited lectures, contributed papers, poster sessions and a workshop on NMR of polymers. The symposium is organized around four themes:

1. *Towards a better understanding and control of polymer materials:* new techniques for polymer analysis and characterization; synthesis and controlled molecular architecture; characterization and modification of polymer surfaces.
2. *Extending the limits of polymers materials:* polymer materials for hostile environments; magnetic, electric and optical properties; advanced processing methods; inorganic, metal–organic and hybrid polymer materials.
3. *Polymer materials as a resource for the future:* polymer materials in the human body; polymer materials from nature; recycling polymer materials; polymer materials in education.
4. *Advancing technology with polymer materials:* applications in information storage and communications; applications in mineral and metal processing; applications in transportation and defence.

Invited lecturers included several members of the IUPAC Macromolecular Division: Prof. A. Abe (Tokyo, Japan); Prof. A. Jenkins, (Sussex, Australia); Prof. K. O'Driscoll (Waterloo, Canada); Prof. T. Saegusa (Kyoto, Japan); Dr D. H. Solomon

Yarra River and the City of Melbourne. POLYMER 91 will be held at Monash University which is situated 20 km from the city centre.

(Melbourne, Australia); Prof. M. A. Winnik (Toronto, Canada).

The official language of the symposium will be English. Translation facilities will not be available.

IUPAC affiliate members and members of national chemical societies will be offered a discount on fees. There will be reduced registration fees for students.

Inexpensive accommodation will be available in the Monash University student halls of residence and these are in easy walking distance from the lecture theatres. Several motels which have rooms with private bathrooms are also located near the campus.

The symposium will be held in the middle of the Australian summer and hot dry conditions can be expected with typical temperatures in the range 15–30°C.

Next IUPAC Congress to be held in Budapest, Hungary

IUPAC SPONSORED

The 33rd IUPAC Congress will be held at the Budapest Sports Palace from Saturday 17 to Thursday 22 August 1991.

Prof. Ernó Pungor (centre) and two other members of the Congress Organizing Committee.

Prominent chemists from all over the world will present plenary and keynote lectures in seven areas of chemistry.

1. *Perspectives of analytical chemistry*

Philosophical aspects of analytical chemistry; New directions in chromatography; New directions in spectroscopy; Possibilities of measurements of single atoms; Perspectives in chemometrics; Robotics in analytical chemistry; Environmental analysis; Trends in nuclear analytical chemistry; Perspectives of pharmaceutical and biomedical analysis; Analysis of giant molecules.

2. *Inorganic and physical chemistry*

Dynamics of elementary reactions; Unimolecular reactions and energy transfer; Kinetics of fast reactions in solutions; Kinetics of radical reactions; New aspects of coordination chemistry in catalysis and kinetics; Laser studies: kinetics, dynamics and spectroscopy; Solid state chemistry; Catalytic combustion; Environmental chemistry.

Invitation to Budapest: the 33rd IUPAC Congress stand at the Stockholm Congress.

3. *Electrochemistry and electroanalysis*

New challenges in electrochemistry and electroanalysis; Electrochemical kinetics; Surface electrochemistry; Perspectives of electrochemical sensor research; Electrochemical energy sources.

4. *Chemistry and biochemistry of biologically active organic compounds*

Supermolecules; Chemistry of natural compounds; Peptides in drug research; Potential drugs; New trends in the chemistry of natural compounds; New aspects of coordination chemistry in biochemistry; Kinetics of biological reactions; Molecular design.

5. *Biotechnology*

Biochemical technology as a new basis for the development of the economy; Bioreactions and their optimization, downstream processes; Microbiological aspects of biotechnology; Environmental biotechnology.

6. *Chemistry of fats*

Fats and nutrition; Fats and cancers; New raw materials for the oil industry.

7. *Polymeric chemistry*

New directions of chemistry of polymers; New results in radical polymerization; Specialities of polymer degradation and advances in stabilization; Functional polymers (liquid crystalline polymers, reactive oligomers, thin layers and membranes, high strength and high temperature polymers); Structure and property correlations of industrial polymers; Development of structural characterization of traditional polymers; New methods of characterization and investigation of polymers; Colloid properties of polymers.

Participants are encouraged to contribute papers, which will be presented as posters. A technical exhibition will also be held at the congress. The official language of the congress will be English.

Budapest is the capital of Hungary. A big metropolis, it treasures the old and embraces the new. It has been called 'The Queen of the Danube'. Hotel accommodation will be arranged by IBUSZ Hungarian Travel Company. Interesting cultural and social programmes will be organized during the occasion.

Budapest treasures the old and embraces the new.

The second circular for the congress is being distributed in September 1990.

Please address all correspondence concerning the congress to: 33rd IUPAC Congress, E. Pungor, c/o Hungarian Academy of Sciences, H-1111 Budapest, Gellért tér 4, Hungary. Tel: +36 (1) 664 705. Fax: +36 (1) 853 493. Telex: 223628 ANAL H.

Conference Calendar

Conference circulars and registration forms for the IUPAC-sponsored conferences listed below may be obtained, upon request, from the names and addresses shown in brackets.

1990

Medicinal chemistry

2–7 September. 11th International Conference on Medicinal Chemistry. Jerusalem, Israel. (Prof. Raphael Mechoulam, Department of Natural Products, School of Pharmacy, Hebrew University, Jerusalem, 91904, Israel.)

Organic chemistry of sulfur

2–7 September. 11th Internal Symposium on the Organic Chemistry of Sulfur. Lodz, Poland.
(Dr Piotr Kielbasiński, Secretary 14th ISOCS, Centre of Molecular and Macromolecular Studies, Polish Academy of Sciences, Sienkiewicza 112, 90–363 Lodz, Poland. Tel. +48 (42) 815832. Telex 886742 pan pl.)

Polymerization reactions

9–13 September. International Symposium on Mechanisms and Kinetics of Polymerization Reactions: Their Use in Polymer Synthesis. Paris, France.
(SYMPOL 90 – Secretariat, Laboratoire de Chimie Macromoléculaire, Université Pierre et Marie Curie — Tour 54 — 4e étage, 4 Place Jussieu, 75252 Paris Cédex 05, France. Tel. +33 (1) 43362525 ext. 5541. Fax. +33 (1) 43544097. Telex UPMC SIX 200 145 F.)

Safety in chemical production

10–13 September. 1st IUPAC Workshop on Safety in Chemical Production. Basel, Switzerland.

(This workshop is not open for general participation but restricted to a limited number of invited participants.)

Solid sampling with optical atomic spectroscopy

8–10 October. 4th International Colloquium on Solid Sampling with Optical Atomic Spectroscopy. Jülich, FRG.
(Dr J. Pauwels, c/o Central Bureau for Nuclear Measurements, Steenweg naar Retie, B 2440 Geel, Belgium.)

Automation and new technology in the clinical laboratory

9–12 October. 4th International Congress on Automation and New Technology in the Clinical Laboratory. Barcelona, Spain.
(Dr Roman Galimany, Sección Automatización. Servicio de Bioquímica, Residencia Sanitaria Germans Trias i Pujol, Carretera Canyet s/n. 08916 Barcelona, Spain.)

Mycotoxins and phycotoxins

4–12 November. International Symposium and Workshop on Mycotoxins and Phycotoxins. Cairo, Egypt.
(Prof. Khayria Naguib, National Research Centre, Dokki, Cairo, Arab Republic of Egypt.)

19th Latin American chemistry congress

5–9 November. 19th Latin American Chemistry Congress. Buenos Aires, Argentina.
(XIX Congreso Lationamericano de Química, Sección Comunicaciones, Sánchez de Bustamante 1749, (1425) Buenos Aires, Argentina.)

Speciality polymers

7–9 November. International Symposium on Speciality Polymers. Singapore.
(Secretary, IUPAC Symposium Organizing Committee, c/o Department of Chemistry, National University of Singapore, Singapore 0511, Republic of Singapore. Fax. 010 +65 7791691.)

1991

Polymer materials

10–15 February. Polymer 91: International Symposium on Polymer Materials: Preparation, Characterization and Properties. Melbourne, Australia.
(Polymer 91 Secretary, PO Box 224, Belmont, Victoria 3216, Australia. Fax. +61 (52) 472657.)

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy.

IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than 3 months in advance. If a visa is not granted 1 month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

In the case of the 32nd IUPAC Congress (Stockholm, Sweden: 2–7 August 1989), it was observed that the time for treating visa applications in Sweden may be as long as 5–6 weeks. To this must be added the time for handling the applications at the Swedish Embassy in the various countries of the intending participants. This confirms the need for applications to be made not less than 3 months in advance.

Organic chemistry: technological perspectives

14–19 April. 2nd International Symposium 'Organic Chemistry: Technological Perspectives'. Baden-Baden, FRG.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, FRG.)

Pharmaceutical and biomedical analysis

28 April–1 May. 3rd International Symposium on Pharmaceutical and Biomedical Analysis. Boston, MA, USA.
(Dr S. H. Y. Wong, Director, Drug Analysis Division, University of CT Health Center, 263 Farmington Avenue, Farmington, CT 06032, USA.)

Vapor–liquid equilibrium

May. 6th International Workshop on Vapor–Liquid Equilibrium in 1-Alkanol + *n*-Alkane Mixtures. Liblice, Czechoslovakia.
(Prof. R. Holub, Vysoka Skola Chemicko-Technologicka, Katedra Fyzikalni Chemie, Suchbatarova 5, 166–28 Prague, Czechoslovakia.)

Spectroscopy

9–14 June. 17th Colloquium Spectroscopicum Internationale. Bergen, Norway.
(17th Colloquium Spectroscopicum Internationale, HSD Congress — Conference, PO Box 1721 Nordnes, N.5024 Bergen, Norway.)

Surface and colloid science

7–12 July. 7th International Conference on Surface and Colloid Science. Compiégne, France.
(Prof. M. Clausse, Université de Technologie de Compiégne,

B. P. 649, F–60206 Compiégne Cédex, France.)

Computers in chemical research and education

14–19 July. 10th International Conference on Computers in Chemical Research and Education. Jerusalem, Israel.
(Prof. Y. Wolman, Department of Organic Chemistry, The Hebrew University, Jerusalem 91904, Israel.)

Rheology of polymer melts

15–18 July. 14th Discussion Conference on Macromolecules Rheology of Polymer Melts. Prague, Czechoslovakia.
(Dr P. Čefelin, Deputy Director, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovskeho n. 2, 162 06 Prague 6-Petriny, Czechoslovakia. Tel. +42 (2) 260341. Fax +42 (2) 367981. Telex 122019 IMCP C.)

Coordination chemistry

19–24 July. 29th International Conference on Coordination Chemistry. Lausanne, Switzerland.
(Prof. A. E. Merback, Institut de Chimie Minerale et Analytique, Universit de Lausanne, Place du Chateau 3, Ch-1005 Lausanne, Switzerland.)

Plasma chemistry

29 July–4 August. 10th International Symposium on Plasma Chemistry. Jerusalem, Israel.
(Prof. R. Avni, Conseiller Scientifique, Ambassade d'Israel, 3 rue Rabelais, F-75008 Paris, France.)

IUPAC General Assembly

7-15 August. 36th IUPAC General Assembly. Hamburg, FRG.
(The IUPAC General Assembly is not open for general participation but restricted to members of IUPAC bodies that meet on this occasion.)

IUPAC congress

17–22 August. 33rd IUPAC Congress. Budapest, Hungary. (33rd IUPAC Congress, Prof. E. Pungor, c/o Hungarian Academy of Sciences, H-1111 Budapest, Gellért tér 4, Hungary. Tel. +36 (1) 664 705. Fax. +36 (1) 851 477. Telex 225931 MUEGY H.)

Organometallic chemistry

25–29 August. 6th International Symposium on Organometallic Chemistry Directed Toward Organic Synthesis (OMCOS). Utrecht, The Netherlands.
(Symposium Secretariat OMCOS 6, Congress Bureau, Royal Netherlands Industries Fair, PO Box 8500, 3503 RM Utrecht, The Netherlands.)

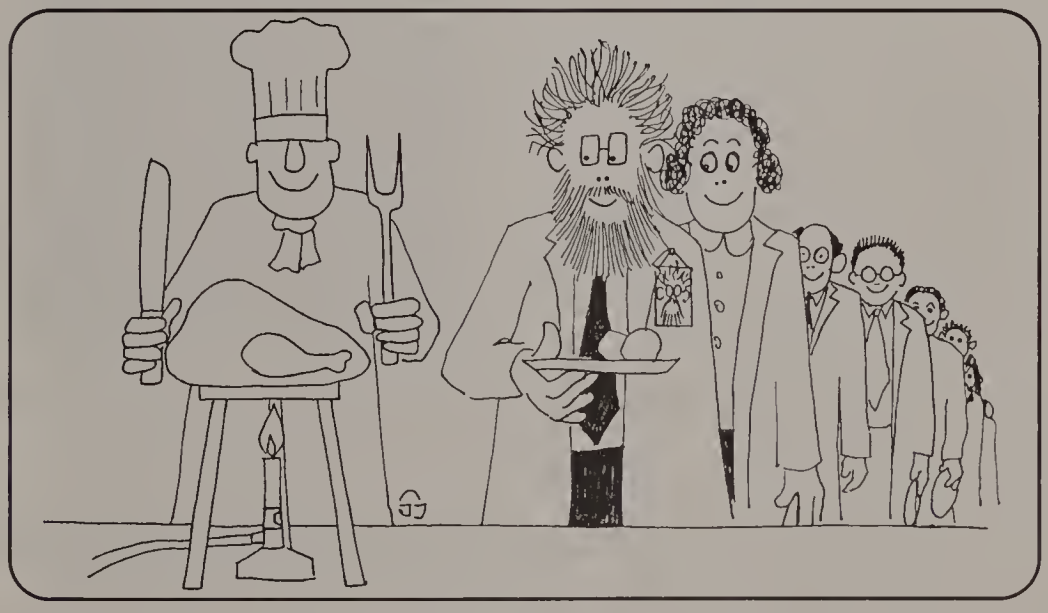
(Prof. R. E. Hester, Department of Chemistry, University of York, York YO1 5DD, UK.)

Mössbauer effect

16–20 September. International Conference on the Applications of the Mössbauer Effect. Nanjing, China.
(Prof. Yuanfu Hsia, ICAME '91, Department of Physics, Nanjing University, Nanjing 210008, China.)

Macromolecule–metal complexes

30 September–5 October. 4th International Symposium on Macromolecule–Metal Complexes. Siena, Italy.
(Prof. R. Barbucci, Dipartimento di Chimica, Universita di Siena, Piano die Mantellini 44, 53100 Siena, Italy,.



Analytical sciences

25–31 August. International Congress on Analytical Sciences. Chiba, Japan.
(ICAS '91 Secretariat, The Japan Society for Analytical Chemistry, 1-26-2, Nishigotanda, Shinagawa, Tokyo 141, Japan.)

Spectroscopy of biological molecules

1–6 September. 4th European Conference on the Spectroscopy of Biological Molecules. York, UK.

New polymers

30 November–1 December. International Symposium on New Polymers. Kyoto, Japan.
(Prof. Toshinobu Higashiura, Department of Polymer Chemistry, Kyoto University, Yoshida, Sakyo-ku, Kyoto 606, Japan.)

CHEMRAWN VII

2–6 December. World Conference on Chemistry of the

Atmosphere: Its Impact on Global Change. Baltimore, Maryland, USA.
(Prof. Robert Sievers, Director of CIRES, Campus Box 216, University of Colorado, Boulder, CO 80309-0216, USA.)

1992

Organic synthesis

5–9 July. 9th International Conference on Organic Synthesis. Montreal, Quebec, Canada.
(Prof. Jean-Claude Richer, Department de Chimie, Université de Montréal, C.P. 6128 succursale A, Montréal, Quebec H3C 3J7, Canada.)

Ring opening polymerization

7–12 July. International Symposium on Ring Opening Polymerization. Warsaw, Poland.
(Prof. Zbigniew J. Jedlinski, Institute of Polymer Chemistry, Polish Academy of Sciences, 34 M. Curie–Sklodowska St., 41–300 Zabrze, Poland.)

Risk management of chemicals

13–16 July. International Symposium on Risk Management of Chemicals: Can Chemicals be Used Safely? Guildford, UK.
(Dr J. F. Gibson, Secretary (Scientific), The Royal Society of Chemistry, Burlington House, London W1V 0BN, UK.)

How to apply for IUPAC sponsorship

To apply for IUPAC sponsorship, conference organizers should write to the IUPAC Secretariat (see inside back cover for address) requesting an Advanced Information Questionnaire (AIQ). Completed AIQs should be returned to the Secretariat preferably **2 YEARS** and at least 12 months before the conference. Late applications will not be considered. Further information on granting of IUPAC sponsorship was published in *CI*, Vol. 11, No. 1, pp.4–5, 1989.

Macromolecules

13–18 July. 34th International Symposium on Macromolecules. Prague, Czechoslovakia.
(Dr P. Čefelín, Deputy Director, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovskeho n. 2, 162 06 Prague 6-Petriny, Czechoslovakia. Tel. + 42 (2) 360317. Telex 122019 IMCP C.)

Natural products

30 August–4 September. 18th International Symposium on Natural Products. Strasbourg, France.
(Prof. G. Ourisson, Centre de Neurochimie, 5 rue Blaise Pascal, F-67084 Strasbourg, France.)

Analytical chemistry

20–26 September. SAC 92: International Conference on Analytical Chemistry. Reading, UK.
(Dr J. D. R. Thomas, School of Chemistry, University of Wales College of Cardiff, PO Box 912, Cardiff CF1 3TB, UK.)

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            5602  SULFURIC/PARTNER
           25150  ACID/PARTNER
            5600  SULFURIC/PARTNER(W)ACID/PARTNER
           32023  RATE CONSTANT/CR
            3397  HYDROLYSIS/CR
      S1     144  (H2SO4 OR SULFURIC(W)ACID)/PARTNER (S) RATE
                  CONSTANT/CR (S) HYDROLYSIS/CR
?s s1 and pyranos?/de
             144  S1
            8961  PYRANOS?/DE
      S2      43  S1 AND PYRANOS?/DE
?t 2/k/40

 2/K/40
2-acetylamino-01-phosphono-2-deoxy-alpha-D- glucopyranose
  German Chem. Name: 2-Acetylamino-01-phosphono-2-desoxy-alpha-D-
      glucopyranose
Chemical Reactions
   Chemical Reaction:
      Partner: aqueous  sulfuric  acid
      Temp: 37 C
      Further Conditions:  Hydrolysis
      Aim of the Study:  Rate constant  (Ref. 1,  handbook),
      (Ref. 2, handbook)
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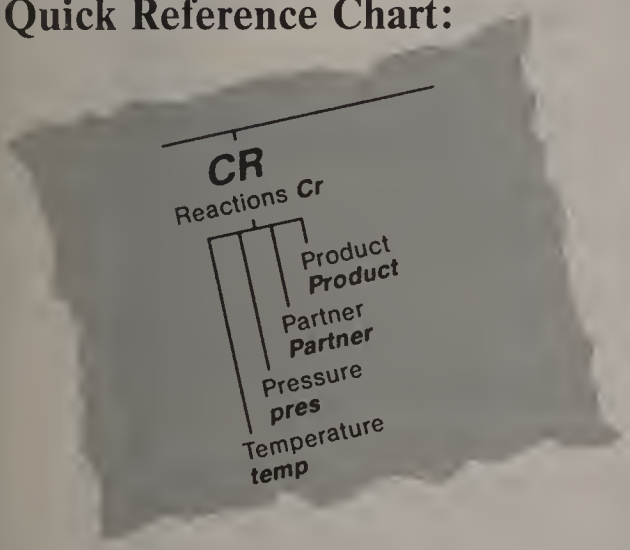

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Interdivisional Committee on Nomenclature and Symbols

Since 1960 the Union has made available to chemists everywhere a very large amount of important material which it handles each year through its regular publication in ***Pure and Applied Chemistry***. The objectives of the journal are:

- to publish the main invited lectures of symposia sponsored by IUPAC at which authoritative and up-to-date accounts of the subject of the symposium are presented by prominent scientists; the lecturers cover their own recent work and review the worldwide literature on the subject;
- to publish the recommendations of the Union's commissions on nomenclature, symbols and units;
- to publish technical reports on standardization, recommended procedures, collaborative studies, data compilations, etc.;
- to publish critically evaluated state-of-the-art commissioned review articles on important topics.

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International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries;
- to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;
- to co-operate with other international organizations which deal with topics of a chemical nature;
- to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 45 countries, each represented by a national organization, such as an academy of science or research council.

National Adhering Organizations

Academy of Scientific Research and Technology **(Arab Republic of Egypt)**
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Chemistry International

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Front cover: Fire at Basingstoke in Hampshire, UK. *(Photos on front cover and page 231 courtesy Basingstoke Gazette)*

International Union of Pure and Applied Chemistry

IUPAC 1989

Maurice Williams

Each year, IUPAC Executive Secretary Maurice Williams prepares a report on IUPAC activities for the International Council of Scientific Unions (ICSU). The following is his 1989 report.

35th General Assembly

The main event for IUPAC in 1989 was its 35th General Assembly, which was held at Lund University, Sweden, in August. Delegates from 37 of the 44 National Adhering Organizations were in attendance. Accounts of the deliberations were given in *Chemistry International* (Nos 1–4, 1990).

The IUPAC Officers for the period 1989–1991 are:
President — Prof. Y. P. Jeannin (France);
Vice-President — Prof. A. J. Bard (USA);
Secretary General — Prof. T. S. West (UK);
Treasurer — Prof. A. Björkman (Denmark).

Romania ceased to be a member of the Union because of arrears in its annual subscription. Applications for membership were accepted from Ethiopia, Kuwait, and Nigeria. The Federación Latinoamericana de Asociaciones Químicas, International Association of Colloid and Interface Scientists, International Group for Correlation Analysis in Organic Chemistry, International Mechanochemical Association, and International Organization for Chemical Sciences in Development were admitted to Associated Organization status, while the Association of Faculties of Science of African Universities–Chemistry Committee lost such status. The Bangladesh Chemical Society was accepted as an Observer country.

Restructuring

Restructuring of the Union was the major task of the year. It featured prominently in President V. A. Koptyug's 'State of the Union' address to the IUPAC Council at Lund. The first of the new mission-oriented programmes — Chemistry and the Environment — was initiated, with Prof. Koptyug as its coordinator. Subcoordinators were appointed to deal with analytical procedures for determination of chemical substances and the measurement of the physicochemical parameters related to the environment, transfer and transformation of chemical substances in the environment, toxiocology of synthetic and natural substances, chemical safety, and prevention of environmental pollution using chemical and biochemical methods.

A booklet containing abstracts of relevant reports issued during the period 1984 to early 1990 by IUPAC Commissions and of their relevant current projects has been prepared and widely circulated. This booklet forms the basis of discussions to see how the Union can be involved more effectively in international environmental activities with organizations such as UNEP* and ICSU-SCOPE†.

*United Nations Environment Programme.
†Scientific Committee on Problems of the Environment.

Secretary General Tom West (left) keeps a watchful eye on President Valentin's Koptyug's use of hand signals during the Council meeting of the 35th IUPAC General Assembly. (Right) Lund University.

The IUPAC Chemistry and the Environment Programme is concerned with several broad topics including 'Prevention of pollution in the environment'. (*Photo courtesy UNESCO/Dominique Roger.*)

Also, the first steps were taken to consider initiating mission-oriented programmes on Chemistry and Advanced Materials and on Chemistry and Biosciences Biotechnology. An overall concept of 'Chemistry in Action' for the restructuring of the Union was proposed, which envisages retention of the traditional core activities of IUPAC (nomenclature, symbols, units and terminology; measurements, testing and standards; chemical education; databases; etc.) together with the new mission-oriented programmes: all bodies of the Union will contribute to both core and mission-oriented programmes.

Another aspect of restructuring became evident with the introduction of the concept of Limited Life Time Commissions (4 years duration only). LLTCs were approved by the IUPAC Council on Isotope Specific Measurements as References, Functional Polymers, Chromatography and Other Analytical Separations, Environmental Analytical Chemistry, Instrumentation and Software in Clinical Chemistry, and Biotechnology in Clinical Chemistry. The Commission on Analytical Reactions, Reagents and Separations was reconstituted as General Aspects of Analytical Chemistry, and the Commission on Analytical Nomenclature was dissolved. The inaugural meeting of the new Medicinal Chemistry Section took place at Strasbourg in February. IUPAC agreed to continue its support for 3 more years for the Joint IUB-IUPAC Commission on Biochemical Nomenclature.

32nd IUPAC Congress

Another break with tradition was in the subdivisions of the scientific programme for the 32nd IUPAC Congress in Stockholm in August, when the time-honoured topics were not physical, inorganic, organic, analytical and applied chemistry, but areas selected for their industrial and social relevance, such as large-scale separation of biological macromolecules, cells and particles; atmospheric and marine chemistry; chemical communications and chemical interactions between organisms.

The total membership of the IUPAC Affiliate Membership Scheme — redesignated as Programme (AMP) — for 1989 (8074 — 82 countries) was up on that for 1988 (7542). The IUPAC Council authorized continuation of the Programme until further notice, and it was agreed to form an AMP Advisory Group from within the Bureau to assume responsibility for and development of AMP henceforth.

IUPAC was satisfied that its best interests will at present be served by continuing the collaboration with Blackwell Scientific Publications, the present main official publisher to the Union, amending the existing publication agreement in terms of the joint experience over the past 5 years. Four more volumes appeared in the Union's important *Solubility data series* (with Pergamon Press), bringing the total to date to 42.

Through its Secretary General, Prof. T. S. West, IUPAC made a major input to the ICSU–UNDP (United Nations Development Programme) proposed initiative for Third World Countries, and three IUPAC projects were selected for submission to UNDP. Arrangements are at an advanced stage to hold the 1st IUPAC Workshop on Safety in Chemical Production (September 1990: Basel, Switzerland) and the CHEMRAWN VII World Conference on Chemistry of the Atmosphere: Its Impact on Global Change (December 1991: Baltimore–Maryland, USA).

Appendix

The following recommendations on nomenclature and symbols were published in 1989:

1. Electrochemical corrosion nomenclature (Recommendations 1988), *Pure Appl. Chem.*, **61,** 19–22, 1989) — Commission on Electrochemistry.
2. System for symbolic representation of reaction mechanisms (Recommendations 1988), *Pure Appl. Chem.,* **61,** 23–56, 1989 — Commission on Physical Organic Chemistry.
3. Detailed linear representation of reaction mechanisms (Recommendations 1988), *Pure Appl. Chem.,* **61,** 57-81, 1989 — Commission on Physical Organic Chemistry.
4. Definitions of terms relating to individual macromolecules, their assemblies and dilute polymer solutions (Recommendations 1988), *Pure Appl. Chem.,* **61,** 211–241, 1989 — Commission on Macromolecular Nomenclature.

5. A classification of linear single-strand polymers (Recommendations 1988), *Pure Appl. Chem.*, **61**, 243–254, 1989 – Commission on Macromolecular Nomenclature.

6. Nomenclature for organic chemical transformations (Recommendations 1988), *Pure Appl. Chem.*, **61,** 725–768, 1989 — Commission on Physical Organic Chemistry.

7. Definitions of terms relating to crystalline polymers (Recommendations 1988), *Pure Appl. Chem.*, **61,** 769–785, 1989 — Commission on Macromolecular Nomenclature.

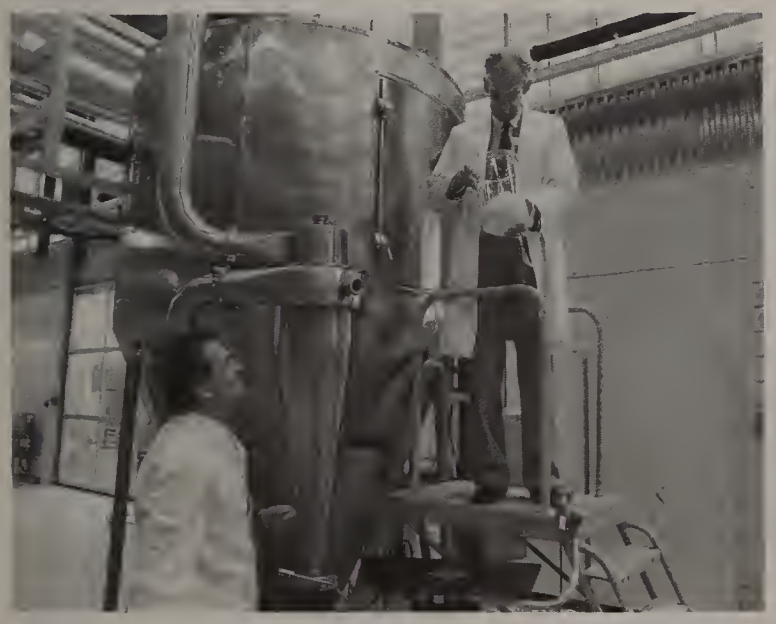
8. Nomenclature for automated and mechanised analysis (Recommendations 1989), *Pure Appl. Chem.*, **61,** 1657–1664, 1989 — Commissions on Analytical Nomenclature and Automation and Clinical Chemical Techniques.

9. Nomenclature of steroids (Recommendations 1989), *Pure Appl. Chem.*, **61,** 1783–1822, 1989 — IUPAC–IUB Joint Commission on Biochemical Nomenclature.

10. Recommendation for EPR/ESR nomenclature and conventions for presenting experimental data in publications (Recommendations 1989), *Pure Appl. Chem.*, **61,** 2195–2200, 1989 — Commission on Molecular Structure and Spectroscopy.

The following technical reports by IUPAC bodies were published during the year:

1. Structure and dielectric properties of vinylidene fluoride copolymers, *Pure Appl. Chem.*, **61,** 83–90, 1989 — Commission on Polymer Characterization and Properties.



Food research at the Chemical Centre, Lund University. In 1989, the IUPAC Commission on Food Chemistry published a report on 'Sodium and potassium assay of foods and biological substrates by atomic absorption spectroscopy (AAS)'. (*Photo courtesy Per Lindström, Lund.*)

2. Definition and classification of interferences in analytical procedures, *Pure Appl. Chem.*, **61,** 91-95, 1989 — Commission on Analytical Reactions and Reagents.

3. Adsorptive stripping voltammetry in trace analysis, *Pure Appl. Chem.*, **61,** 97-112, 1989 — Subcommittee on Environmental Analytical Chemistry.

4. Sodium and potassium assay of foods and biological substrates by atomic absorption spectroscopy (AAS), *Pure Appl. Chem.*, **61,** 113–120, 1989 — Commission on Food Chemistry.

5. Chemical actinometry, *Pure Appl. Chem.*, **61,** 187-210, 1989 — Commission on Photochemistry.

6. Voltammetric techniques for complexation measurements in natural aquatic media. Role of the size of macromolecular ligands and dissociation kinetics of complexes, *Pure Appl. Chem.*, **61,** 255–274, 1989 — Subcommittee on Environmental Analytical Chemistry.

7. Preparation of aims and objectives for the teaching of clinical chemistry (Guidelines 1986), *Pure Appl. Chem.*, **61,** 275–279, 1989 — Commission on Teaching of Clinical Chemistry.

8. Determination of pH in highly saline waters, *Pure Appl. Chem.*, **61,** 1133-1138, 1989 — Subcommittee on Environmental Analytical Chemistry.

9. Sample digestion for determination of elemental traces in matrices of environmental concern, *Pure Appl. Chem.*, **61,** 1139-1146, 1989 — Commission on Microchemical Techniques and Trace Analysis.

10. Analytical techniques for trace organic compounds II. Detectors for gas chromatography, *Pure Appl. Chem.*, **61,** 1147–1160, 1989 — Commission on Microchemical Techniques and Trace Analysis.

11. A proposal for use of a standard format for publication of stability constant measurements, *Pure Appl. Chem.*, **61,** 1161–1163, 1989 — Commission on Equilibrium Data.

12. Determination of 2–thiobarbituric acid value: direct method — results of a collaborative study and standardised method, *Pure Appl. Chem.*, **61,** 1165-1170, 1989 — Commission on Oils, Fats and Derivatives.

13. Melting temperatures of refractory oxides — Part II: lanthanoid sesquioxides, *Pure Appl. Chem.*, **61,** 1461-1482, 1989 — Commission on High Temperatures and Solid State Chemistry.

14. Total and spontaneous fission half-lives for uranium, plutonium, americium and curium nuclides, *Pure Appl. Chem.*, **61,** 1483-1504, 1989 — Commission on Radiochemistry and Nuclear Techniques.

15. Re-examination of 2200 metre/second cross section experiments for neutron capture and fission standards, *Pure Appl. Chem.*, **61,** 1505-1510, 1989 — Commission on Radiochemistry and Nuclear Techniques.

16. Concentration units in water chemistry, *Pure Appl. Chem.*, **61,** 1511–1515, 1989 — Commission on Water Chemistry.

17. Precipitation of major constituents for trace preconcentration: potential and problems, *Pure Appl. Chem.*, **61,** 1643–1656, 1989 — Commission on Microchemical Techniques and Trace Analysis.

18. Recommended methods for purification of solvents and tests for impurities: benzene and toluene, *Pure Appl. Chem.*, **61,** 1823-1828, 1989 — Commission on Electroanalytical Chemistry.

19. *Solubility data series, Volume 39 — Cumulative index for vols 20–38,* Pergamon Press, Oxford, 1989 — Commission on Solubility Data.

20. *Solubility data series, Volume 40 — Halides, oxyhalides, and salts of halogen complexes of titanium, zirconium, hafnium, vanadium, niobium and tantalum,* Pergamon Press, Oxford, 1989 — Commission on Solubility Data.

21. *Solubility data series, Volume 41 — Alkaline earth metal perchlorates, Pergamon Press, Oxford, 1989* — Commission on Solubility Data.

22. *Solubility data series, Volume 42 — Hydrogen halides in non-aqueous solvents,* Pergamon Press, Oxford, 1989 — Commission on Solubility Data.

Twenty-four symposia were sponsored by IUPAC in 1989.

1. International Conference on Fats, Auckland/ New Zealand, February. (Proceedings published by Ellis Horwood Ltd., 1989.)

2. 6th International Conference on High Temperature and Energy-related Materials, Gaithersburg, Maryland/USA, April, *(Pure Appl. Chem.*, **62,** No. 1, 1990.)

3. 9th International Symposium on Cationic Polymerization and Related Ionic Processes, Strasbourg/France, June. (Proceedings published as Vol. 32 in the Macromolecular Symposia Series to *Die Makromolekulare Chemie* by Hüthig & Wepf Verlag, Basel.)

Participants at the opening ceremony of the 32nd IUPAC Congress in Stockholm.

4. International Congress Chevreul for Study of Fats, Angers/France, June. (Proceedings published in *Revue Française des Corps Gras,* **36,** No. 3–4, 1989.)

5. International Symposium on Molecular Design of Functional Polymers, Seoul/Korea, June. (Proceedings published as Vol. 33 in the Macromolecular Symmposia Series to *Die Makromolekulare Chemie* by Hüthig & Wepf Verlag, Basel.)

6. 11th International Conference on Phosphorus Chemistry, Tallinn/USSR, July. (Proceedings to be published in *Phosphorus, Sulfur and Silicon.*)

7. 27th International Conference on Coordination Chemistry, Gold Coast, Queensland/Australia, July. (*Pure Appl. Chem.*, **62,** No. 6, 1990.)

8. 32nd Microsymposium on Macromolecules: Polymer Blends, Prague/Czechoslovakia, July. (Proceedings to be published as a volume in the Macromolecular Symposia Series to *Die Makromolekulare Chemie* by Hüthig & Wepf Verlag, Basel.)

9. 4th International Conference on Bioinorganic Chemistry, Cambridge, MA/USA, July. (Proceedings will not be published.)

10. SAC 89: International Conference on Analytical Chemistry, Cambridge/UK, July/August. (Proceedings to be published in *The Analyst.*)

11. International Conference on Calorimetry and Thermodynamics, Beijing/China, August. (Proceedings to be published in *Thermochimica Acta.*)

12. 32nd IUPAC Congress, Stockholm/Sweden, August. (Proceedings will not be published.)

13. 20th International Conference on Solution

Chemistry, Jerusalem/Israel, August. (*Pure Appl. Chem.*, **62,** No. 1, 1990.)

14. 10th International Conference on Chemical Education, Waterloo/Canada, August. (Proceedings not yet published.)
15. 6th International Symposium on Novel Aromatic Compounds, Toyonaka, Osaka/Japan, August. (*Pure Appl. Chem.*, **62,** No. 3, 1990.)
16. 12th International Congress of Heterocyclic Chemistry (ICHC), Jerusalem/Israel, August. (*J. Heterocyclic Chem.*, **27,** No. 1, 1990.)
17. 40th International Society of Electrochemistry Meeting, Kyoto/Japan, September. (Proceedings will not be published.)
18. International Conference on Applications of Mössbauer Effect, Budapest/Hungary, September. (Proceedings to be published in *Hyperfine Interactions.*)
19. 9th International Symposium on Plasma Chemistry, Pugnochiuso/Italy, September. (To be published in *Pure Appl. Chem.*)
20. 5th International Workshop on Vapor-liquid Equilibria in l-Alkanol + n–Alkane Mixtures, Trieste/Italy, September. (Proceedings will not be published.)
21. International Symposium on Thin Solid and Liquid Films, Bristol/UK, September. (Proceedings to be published in *Colloids and Surfaces.*)
22. 3rd International Seminar on Flame Structure (ISFS–89), Alma-Ata/USSR, September. (*Pure Appl. Chem.*, **62,** No. 5, 1990.)
23. International Conference on Nitroxide Radicals (ICNR–89), Novosibirsk/USSR, September. (*Pure Appl. Chem.*, **62,** No. 2, 1990.)
24. 5th International Symposium on Organometallic Chemistry Directed toward Organic Synthesis, Florence/Italy, October. (*Pure Appl. Chem.*, **62,** No. 4, 1990.)

News & Views

21st FECS General Assembly

The 21st General Assembly of the Federation of European Chemical Societies (FECS) was held in Frankfurt/Main, FRG, on 12–13 June 1990. Twenty of the 38 member societies from 28 countries were represented, together with one observer society. An application for membership from the Romanian Society of Analytical Chemistry was approved. Consideration is being given to whether the statutes of FECS should be redrafted to allow the Israel Chemical Society to apply for full membership of the Federation. Data are being collected in readiness to issue the sixth edition of the FECS Membership booklet.

20 YEARS
Federation of European Chemical Societies
Fédération des Sociétés Chimiques Européennes
Föderation Europäischer Chemischer Gesellschaften
Федерация Европейских Химических Обществ

The Assembly was preceded on 11th June by a commemorative session to mark the 20th Anniversary of the formation of the Federation. In his opening address, Dr W. Fritsche (Chairman of the FECS Council) presented a brief review of the history of the Federation and an outlook into the future. It was followed by lectures from Prof. E. Bayer (Chairman of the GDCh Advisory Committee on Existing Chemicals) on 'How can chemistry actively participate in the environmental debate?' and from Prof. F. Piacenti (Chairman of the FECS Discussion Group on Conservation of the Cultural Heritage) on 'Chemistry for the conservation of monumental buildings'.

In addition to the FECS annual report for 1989, written reports were received from nine Working Parties (Analytical Chemistry, Chemical Education, Chemistry and the Environment, Computational Chemistry, Electrochemistry, Food Chemistry, History of Chemistry, Organometallic Chemistry, and Professional Affairs) and from the discussion Groups on Conservation of the Cultural Heritage (which was upgraded to Working Party status at Frankfurt) and on Chemistry in Developing Countries. The Working Party on Interfacial Phenomena was dissolved due to its lack of activity.

The Council, which acts for the Federation during the intervals between the General Assemblies, will continue to be chaired for the next period by Dr W. Fritsche (Gesellschaft Deutscher Chemiker, FRG). Dr V. Chvalovsky (Czechoslovak Chemical Society),

The FECS Award for 1990 was presented to Prof. Robert Kellner (Gesellschaft Osterreichischer Chemiker) for his outstanding services as Secretary of the Working Party on Analytical Chemistry.

Prof. C. Barré (Société Françaises de Chimie), Dr E. J. de Ryck van der Gracht (Royal Netherlands Chemical Society), Prof. E. Fanghänel (Chemische Gesellscaft der GDR) and Dr R. Darms (Swiss Committee for Chemistry) continue as Council Members and, after a ballot, two vacancies were filled by Dr F. A. Battig (Gesellschaft Österreichischer Chemiker) and Prof. I. Rasines (Spanish Royal Society of Chemistry).

In order to derive guidelines for a modern analytical chemistry curriculum, the WP on Analytical Chemistry has conducted an enquiry in its member countries. The evaluation of the answers is to be presented at Euroanalysis VII (Vienna, 16–31 August 1990), including a 'hit list' of textbooks and exemplary model curricula. The proceedings of the 3rd FECS Conference on Chemistry and the Environment (Guildford, UK: July 1988) have been published by the Royal Society of Chemistry (ISBN 0 85186 118 0). The next FECS Conference in this series is being planned for Vienna in 1992, with either Atmospheric Chemistry or Chemistry and Waste as the topic. The WP on Electrochemistry has just issued its first survey of Electrochemical Research Centres in Europe: six countries are included, and it is hoped to extend the coverage in the next edition.

Dr Jack Gow (UK Royal Society of Chemistry) (right) discusses with Dr András Edelényi (Hungarian Chemical Society) their responsibilities as Joint General Secretaries of the Federation.

Two major events being organized by the WP on Food Chemistry in 1991 are Euro Food Tox III: Effects of Food on the Immune and Hormonal Systems (Zürich, 23–24 May 1991) and Euro Food Chem VI: Strategies for Food Quality Control and Analytical Methods in Europe (Hamburg, 23–25 September 1991). The IXth FECHEM Conference on Organometallic Chemistry is scheduled to be held in Heidelberg on 15–19 July 1991. Copies are now available of the fifth edition of the booklet Organometallic Research Centres in Europe. After careful consideration, the Assembly accepted a Council recommendation not to set up a separate Young European Chemical Society.

Dr M. Williams
IUPAC Executive Secretary

Trace elements in medicine and biology

The 3rd International Congress on Trace Elements in Medicine and Biology will be held at Les Deux Alpes, France, 15–18 January 1991.

Further information from: Arlette Alcaraz, Laboratoire de Biochimie C, CHRU de Grenoble, BP 217 X, 38043 Grenoble Cedex, France. Tel: +33 76 42 81 21 Ext. 4465.

Inorganic and organometallic chemistry

Inorganic Chemistry 1991: International Symposium on Inorganic and Organometallic Chemistry, will be held at the University of Waikato, Hamilton, New Zealand from 28 January to 1 February 1991.

Further information from: Dr B. K. Nicholson, Chemistry Department, University of Waikato, Hamilton, New Zealand. Tel: +64 (71) 562889. Fax: +64 (71) 560115.

Microbial corrosion

The 2nd European Federation of Corrosion Workshop on Microbial Corrosion will take place in Sesimbra, near Lisbon, Portugal 3–6 March 1991.

Further information from: C. A. C. Sequeira, Instituto Superior Técnico, Av. Rovisco Pais, 1096 Lisboa Codex, Portugal/A. K. Tiller, National Physical Laboratory, Teddington, Middlesex TW11 01W, UK.

Prize for trace elements research

The French laboratories LABCATAL has decided to create a prize to promote scientific research in the field of trace elements. The first prize, amounting to FRF 35 000, and three second prizes of FRF 5000 each will reward scientific work on trace elements in the fields of pharmacology or human therapeutics.

The winners will receive their prizes during the 3rd International Congress on Trace Elements in Medicine and Biology: Chromium and Trace Elements in Endocrinology. This congress, organized by the French Society for Essential Trace Element Study (SFERETE), will be held in Les Deux-Alpes from 14 to 18 January 1991.

For further information about the LABCATAL prize please contact: Scientific Direction, Laboratories LABCATAL, 7, rue Roger Salengro, BP 305, 92541 Montrouge Cedex, France. For information about the SFERETE congress please contact: Mrs A. Alcaraz, Hopital A. Michallon, Laboratoire de Biochimie C, BP 217 X, 38043 Grenoble Cedex, France.

We regret to record the death of

Prof. A. Albert, Australia (29 December 1989) — Section on Medicinal Chemistry (1969–1975).

Prof. P. Krogh, Denmark (1 May 1990) — Commission on Trace Substances (1969–1971), Commission on Food Contaminants (1971–1979), Commission on Food Chemistry (1979–1990).

Names and Addresses

Full details (names, addresses, telephone/telex/fax numbers) of all commission and committee chairpersons and secretaries and IUPAC offices were published in the November 1989 issue of *CI* (Vol. 11, No. 6, 225–235). The IUPAC Secretariat has been notified of the following additions and changes.

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Affiliate Affairs

Affiliate participation in the work of IUPAC

The overall aims of the IUPAC affiliate membership programme are:

- to disseminate information about IUPAC and its activities as widely as possible; and
- to maximize the participation of chemists throughout the world in the affairs of IUPAC.

Affiliates who wish to know more about the work of IUPAC in a particular specialization and who wish to become involved in this work may contact the appropriate IUPAC body directly. A list of names and addresses of chairmen and secretaries of all IUPAC commissions, committees and divisions was published in the November 1989 issue of *CI* (Vol. 11, 225–235).

Affiliate reduction of conference registration fees

It is a condition of IUPAC sponsorship of a conference that IUPAC affiliates are entitled to a 10% reduction or 'own members' rate on the registration fee for scientific participants. This concession is usually — but not always — announced in the conference circulars and indicated on the registration form.

To receive this reduction an affiliate must declare on the conference registration form that he/she is an affiliate. Alternatively the affiliate should apply in writing to the conference organizer for this reduction stating that he/she is an affiliate. Conference organizers may check with the IUPAC Secretariat that applicants for this reduction are

currently registered as affiliates.

If an application for this reduction is refused, an affiliate should immediately notify the Affiliate Affairs Secretary at the IUPAC Secretariat in Oxford and, if possible, forward copies of documentary evidence of this refusal.

In some cases an affiliate may find it helpful to produce a certificate of affiliate membership to support his/her application for a reduction. The Secretariat is happy to supply, upon request, an affiliate certificate valid for the current year. Unfortunately, for administrative reasons, IUPAC is unable to mail such certificates to all affiliates each year.

IUPAC posters

Copies of this poster are available free of charge to affiliates and members of IUPAC's commissions and committees. The poster is printed in blue and black on a white background and is approximately 42 × 19 cm in size.

IUPAC welcomes any publicity you can give to its activities. If you would like to display one or more copies of the poster in your department or elsewhere please write to the Information Officer at the IUPAC Secretariat in Oxford stating your name and address and how many copies of the poster you wish to receive.

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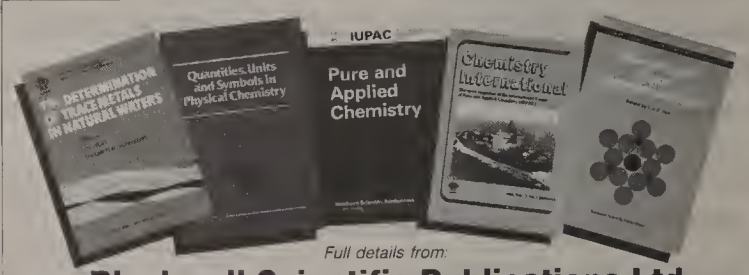

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IUPAC affiliate Saverio Florio (left) poses for the camera at the Annual Congress of the Royal Society of Chemistry held in Belfast, Northern Ireland in April 1990. Florio is Professor at the Dipartimento di Biologia, University of Lecce, Italy. He is seen with Professor M. Novi (centre) who is at the University of Genoa, Italy and Professor P. H. Laur (right) from RWTH Aachen University, FRG. The photograph was taken at a reception in Parliament Buildings, Stormont hosted by Peter Brooke (Secretary of State for Northern Ireland).

Chemistry: the mother science

Bryant W. Rossiter

Bryant Rossiter, IUPAC's first Chairman of the CHEMRAWN Committee, asserts that the future well being of our planet and its people is highly dependent upon the success of the chemical profession. Hopes for our future world are based upon the skills of those who understand the basics of chemistry, whose knowledge is at the cutting edge of their respective fields, and whose professional skills are sufficiently esteemed in the market-place to keep them productively employed throughout their professional lifetimes. Only when this is done can we hope to benefit society at large and to advance world progress through chemistry.

Some years ago a survey, that was designed to determine the impact of television on the attitude of children in the USA, posed this question: 'Which do you love more, your father or your television set?' I was astonished to learn that 46% of the children polled said they loved the television set more. I was sure these statistics did not apply to me since I worked very hard at being a good parent and felt I was an 'ideal father'. So, with great confidence, I asked my young son: 'Matthew, which do you love more, your father or the television set?'

This thoughtful young man stared at the floor for a moment, shuffled his feet, and then looked up with big innocent blue eyes and said, 'Do you mean the coloured TV or the old black and white down in the basement?'

In a sense we chemists find ourselves in a similar position. We are confident we are doing a reasonably good job, but others are less sure. A recent public opinion survey by Cambridge Reports Incorporated seems to agree. For example, the surveyors found that 83.8% of those polled believe that the science of chemistry produces more desirable than undesirable results. At the same time, the public has a negative view of chemicals and the chemical industry that employs most of us. The question was asked, 'When problems with chemicals are identified, which one group of society is most to blame?' Of those polled 45.9% said chemical manufacturers were at fault, which is up from 32.3% from 1980.

The late George Pimentel, Past-President of the Amercian Chemical Society, conducted a non-scientific personal poll of newspaper articles appearing in the San Francisco Bay area, and he found that over 90% of the articles relating to chemistry were negative in nature and dealt with chemical spills, toxic wastes, water and air pollution, fear of nuclear energy, etc. Many of the reports were distorted or inaccurate. Some may question the results of this poll. However, few within the world-wide chemical industry question that one of the major concerns of the industry is its poor public image.

Some of the negativism found in the press can serve as a valuable prod for introspection and corporate self-improvement. However, carried to an extreme, it leads to misunderstanding, public distrust, and misplaced governmental initiatives and industrial funding priorities. In addition it discourages top students from entering the field, and for the public it leads to the debilitating disease of doubt and pessimism.

Bryant W. Rossiter was IUPAC's first Chairman of CHEMRAWN. He was formerly Director, Chemistry Division, Eastman Kodak Company, Rochester N.Y., USA, and now resides at 25662 Dillon Road, Laguna Hills, California 92653, USA.

These diseases can affect individuals, professions, and entire societies. Thus there is a constant concern that: the world will be unable to feed itself; we will deplete our energy resources; we will pollute ourselves to death; or we will soon be engulfed by AIDS. Again fear factors can be useful and healthy stimulants provided society does not proliferate the enunciators of problems at the expense of those who have the capacity to solve them. As President John F. Kennedy noted, 'The announcement of lofty ideals is not enough, we need those capable of bringing those ideals about'.

Benjamin Franklin was such a person when

This article is based on an address entitled 'Chemistry, the mother science: a solver of problems and hope of the world' presented by Bryant Rossiter at the 3rd Chemical Congress of North America which was held in Toronto, Canada in June 1988. The address was given as part of the American Institute of Chemists 57th Members and Fellows Lecture Award.

struggling through a revolutionary war and attempting to give birth to a new nation, he said:

> It is impossible to imagine the height of which may be carried, in a thousand years, the power of man over matter. We may perhaps learn to deprive large masses of their gravity, and give them absolute levity, for the sake of easy transport. Agriculture may diminish its labour and double its produce: all diseases may by sure means be prevented or cured . . .

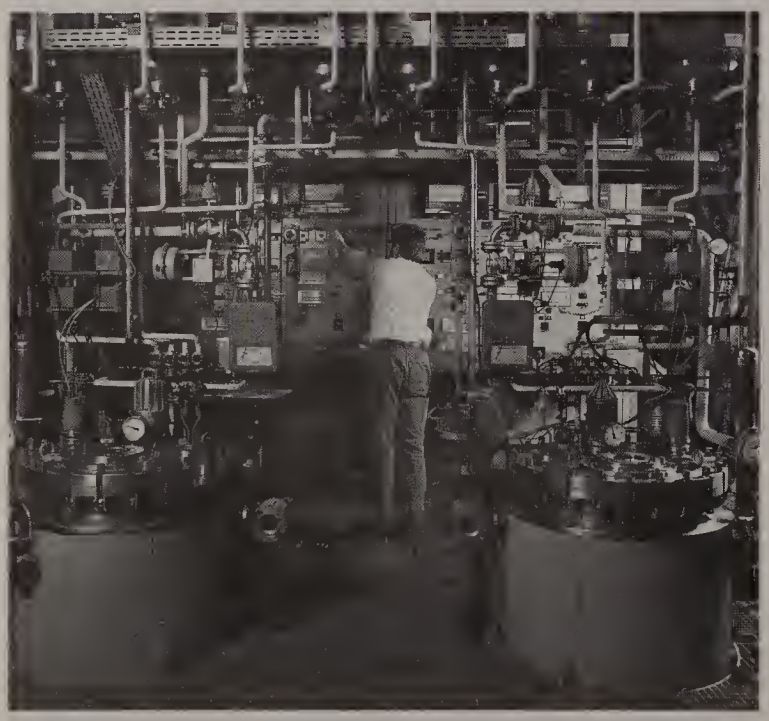
While many anguished over the problems, Franklin had a vision of a much brighter future, and he contributed significantly to the realization of that future.

In his book *Enough of pessimism,* Philip Abelson, the former editor of *Science Magazine,* and a man with whom I had the opportunity to serve as a member of the magazine's advisory board, decries the poverty of scientific leadership among non-political and other public figures. Abelson in an editorial of January of 1976, said:

> Our poverty goes beyond a lack of leadership. It extends to a malaise of the spirit of our people. Indeed, such is the pathology that, even if the Messiah should appear, he or she would either go unrecognized or, if recognized, would soon be chopped down to size. At the same time this country has turned its back on optimism and is becoming a nation of pessimists.

The editorial concludes:

> Pessimism is a kind of sickness that debilitates the individual and the country. One would not advocate that we become a nation of pan glosses. However, enough of pessimism. It leads nowhere but to paralysis and decay.



Chemistry plays a central and pivotal role in feeding a hungry world, providing drugs and vaccines, and producing high-technology materials for such important areas as energy, transportation and communication. ***(Photo courtesy CIBA-GEIGY Limited.)***

More than any other profession or industry, chemistry, the most utilitarian of all of the scientific disciplines, has the capacity to lift this veil of pessimsim and to meet the essential needs of humanity, including those of a clean environment. In a world that increasingly demands interdisciplinary solutions to the needs of mankind, chemistry plays a central and pivotal role in feeding a hungry world, providing drugs and vaccines, and producing high-technology materials for such important areas as energy, transportation and communication.

CHEMRAWN I

I have witnessed the pervasive nature of chemistry and its impact upon society through membership of the Research Advisory Committee of the United States Agency for International Development and through participation in the IUPAC CHEMRAWN conferences, i.e. conferences devoted to CHEMical Research Applied to World Needs.

The first CHEMRAWN meeting, the 'World Conference on Future Sources of Organic Raw Materials', was held in Toronto, Canada, in 1978. It was held at a time when the world was awash in the effects of the OPEC oil embargo. The issues of the adequacy of world resources of organic materials were so important that one could predict with a high degree of probability an across-the-board drop in the world's standard of living unless an effective strategy for material management was evolved swiftly. Advanced nations stood to lose greatly, but the effects on the less developed peoples would be even more devastating.

The main question asked in this conference was: 'What are the alternatives to petroleum?' The answer: 'In the short term, there are no alternatives to petroleum'. This was hard to believe since just over 100 years ago all of our materials were natural with the exception of the metallic, glass and ceramic objects that were crafted from natural materials. There were no synthetic fibres. The only plastics available were those derived from wood, leather and other animal materials. All our pharmaceuticals, food additives and detergents were from natural resources.

Oil prices have decreased since that meeting, but most people believe this is temporary. The North Alaskan slopes and the North Sea fields are already projected to be depleted toward the end of this century. New discoveries will be made, but there will be an inevitable decline. We will, of course, never run out of petroleum; it will simply be priced beyond our ability to pay for it. The hope of the future rests largely on the chemical and chemical engineering professions to produce new

alternatives to petroleum, particularly from the liquefaction of coal. Recent improvements have lowered the cost of production to the equivalent of USD 35/barrel. Further cost reductions are anticipated through the development of new catalysts and the more cost-effective use of hydrogen. Both require a thorough knowledge and understanding of chemistry.

To a significant degree conservation is responsible for the present oil glut and lower oil prices. Where would conservation be without new energy insulations and building materials, heat-reflecting and absorbing glasses, lightweight engineering plastics for lighter aircraft and automobiles, and new materials produced by energy-conserving methods. For instance, in many applications, we would actually consume more energy by switching from plastics back to metal. This is also true of man-made fibres. A Yale University study, initially financed by the National Science Foundation, determined that over the life of the product, an all-cotton shirt consumes 88% more energy than a shirt containing a blend of 65% polyester and 35% cotton. These examples can be multiplied over and over again.

CHEMRAWN II

In 1979, IUPAC, working in co-operation with the International Rice Research Institute in the Philippines, the World Bank, members of the World Food Council, the United States Agency for International Development, and the American Chemical Society began the planning of CHEMRAWN II, the 'International Conference on Chemistry and World Food Supplies — The New Frontiers'. The meeting was held in December 1982, in Manilla, Philippines. The purpose of the meeting was to detemine how the world would feed itself in the 21st century. Again pessimism was rampant in the land, and there were just reasons for serious concern.

If the hungry and malnourished of the world were collected into centres the size of Toronto, there would be over 100 such cities. ***(WHO photo by A. Kochar.)***

Many studies indicate that at least one out of every eight men, women and children on earth suffers from malnutrition severe enough to shorten life, stunt physical growth, and dull mental ability. The Food and Agricultural Organization of the United Nations estimated that approximately 450 million people — twice the population of the United States — were eating less than their minimum energy requirements. If the hungry and malnourished of the world were collected into centres the size of Toronto, there would be over 100 such cities.

The World Bank reported a global interdependence on food wherein two straight years of bad harvests in any one of the major grain-producing nations of the world could precipitate another food crisis like the one that occurred in 1972-74. This, in turn, could upset fragile economies in developing countries already burdened with debt and poverty-inspired social unrest.

Demands of the future would be even greater. Given present trends, world population will expand to more than six billion people by the end of this century and eight out of every ten people will live in a developing country. Many will migrate to urban centres, where food is not grown. In 1975, only 90 cities in the developing world had over one million inhabitants: by the year 2000 there will be over 300 such cities. Some metropolitan areas, such as Mexico City, may be inhabited by 20 million people.

In the next 40–50 years, annual world food production must triple that achieved since the dawn of agriculture 12 000 years ago if the growing numbers of people are to be fed and their growing demands for better diets are to be met. Furthermore, this must be accomplished without adding significant amounts of new land to the system since most good agricultural land is already in production — in fact, many believe prime agricultural land is dwindling because of urban sprawl, overuse, and desertification.

Some say that population control is the only answer. In the long-term, the food/population balance must be brought under control. In the meantime, as reported in the *New York Times,* most food experts agree that poverty and lack of jobs, not overpopulation, are the primary reasons for starvation and malnutrition in the world. Poverty and overpopulation are not necessarily synonymous. The world's most densely populated areas, such as Japan, The Netherlands, Singapore, and China, have no serious food problems.

In any event, there is little that can be done to influence population growth between now and the end of the century, since mothers of the year 2000 will shortly enter their childbearing years. If, for example, India had reached a population replace-

ment value of two children per couple in 1980, the population of India still would rise from 675 to 840 million by year 2000. So we have no alternative but to produce more food.

Hunger and malnutrition are exacerbated by the rising middle-class populations and their demands for more desirable and less efficiently produced food, such as meat. The use of grain as a food source for animals and human population creates competitive market pressures that push the price of basic food commodities still higher and beyond the reach of still more poor people of the world. It is ironic that unless low food prices are maintained, improved living conditions for some creates hunger and malnutrition for others.

These are the conditions that existed at the time of CHEMRAWN II and in many ways continue to exist today. Yet, with the exception of certain parts of Africa, the world is becoming increasingly food self-sufficient. To some extent, the concerns of the United States Agency for International Development, with the exception of those for Africa, are turning from food shortages to food abundance. Soy bean producers in South America are posing a serious competitive challenge to growers in the USA. India and other countries in South-East Asia are grain exporters. Chemistry contributed mightily to these advances, as it was the new fertilizers, pesticides, yield promoters, food stabilizers, and dietary supplements, along with new rice and wheat strains, that made the first 'green revolution' possible. To handle the food demands of the future there must be a second 'green revolution'.

If the world is to triple food production in the next 40 years, and do it on less land, more intensive farming is required. More intensive farming means more intensive chemical input in terms of more efficient and genetically engineered plants and more selective, more efficient, and more environmentally safe usages of fertilizers, growth regulators, pesticides and water. These efforts will require entirely new generations of chemically inspired, genetically engineered plant species and agricultural chemicals.

To date, 95% of the world's food problems are in the developing countries, but 95% of the research capable of solving these problems is still done largely in the USA and in a few other countries. This poses tremendous responsibilities as well as opportunities for those in chemistry and related fields because we have the best means of contributing positive, useful, and cost-effective ways to meet future world food needs.

Chemistry is most important in the field of human health. As President of a pharmaceutical company engaged in cancer and anti-viral research, including AIDS, it is very clear to me that the future belongs to those who understand cell biology and biochemistry. Pharmaceutical research is moving away

The CHEMRAWM V Conference on Current and Future Contributions of Chemistry to Health was held in Heidelberg, FRG, in 1986.

rapidly from the days when thousands of compounds were screened in search of biological effects. More and more prophylactic and therapeutic drugs are being designed and synthesized based on a detailed knowledge of chemical reactions at cell surfaces, membrane transport, and enzyme catalysed or mediated reactions.

A recent report in *Science Magazine* describes the detailed three-dimensional structure of an oncogene protein and how a non-cancer-producing gene can be transformed into a cancer-producing gene by the substitution of a single amino acid. Indeed, it is now believed possible to map precisely the complete genetic code of a human being. The task is one of enormous difficulty — one person's genetic code noted chemically on paper would fill more than one million textbook pages. Yet few people doubt that this mapping can or will eventually be done — a reaffirmation that chemistry is indeed at the root of all life's processes.

CHEMRAWN VI

Few conferences have drawn as much public attention as CHEMRAWN VI, the World Conference on Advanced Materials for Innovations in Energy, Transportation, and Communication. Held in May 1987, in Tokyo, Japan, the content of this conference has enormous implications for the future comfort and well-being of mankind.

In the early development of the industrial revolution, new materials were drawn from natural resources and used mainly for building materials.

The development of advanced materials is very closely connected with the advancement of our fundamental understanding of basic processes occurring at the atomic and molecular levels. Rapid development of modern materials has been accompanied by a strong interdisciplinary effort leading to a synergism between various scientific and engineering disciplines. Again, chemistry is at the core of it all.

Consider, for example, the importance of chemistry in solid-state electronic devices. To begin with, they would not be possible without photosensitizers and polymeric photoresistors, which are essential to the photo-microlithographic process. An understanding of solid-state chemistry is crucial to the design of solid-state devices and our ability to precisely locate, control, and measure chemical species in the semiconductor matrix at levels of parts per billion or less.

Similarly, our hopes for the conversion of solar energy to electricity rests on our ability to produce precisely designed, thin-film photoelectric devices based on the detailed knowledge of solid-state chemistry and thin-film chemical vapour deposition processes.

Automobiles and aircraft are the major means of transportation today. In the future, new technology will give development to other means of transportation based on high-temperature superconductivity. When this technology is available, magnetically levitated trains will drastically alter transportation patterns throughout the entire world. The ability to do this economically is entirely dependent on the design and fabrication of precise chemical systems leading to high-temperature superconductivity.

We will see other major changes in the transportation field, nearly all of which will be chemically induced. Fifteen years ago, less than 4% of the weight of a car was plastic. Today it is 7%, and it is expected to be 12% in just a few more years. The increasing use of engineering plastics will reduce cost and increase performance in terms of energy efficiency, safety, and durability.

Similarly, higher strength and lower weight polymeric materials will have a tremendous influence on aircraft manufacture. Carbon and kevlar reinforced polymers are beginning to be used in the primary structures of commercial aircrafts. Some predict that as much as 20% of aircraft bodies made in 1995 will be polymeric in nature and perhaps 40% by the year 2000. For supersonic aircraft, the development of high-temperature materials is essential. Titanium alloys and titanium-based composites, and in some cases aluminium-based composites, will be used for aircraft body skins to withstand the high temperatures generated. In fact, supersonic commercial aircraft may well depend on the invention of new heat-resistant metal alloys and new fabrication technologies, all of which requires a profound understanding of the chemistry involved.

Consider the impact of chemistry on just five areas: energy, food production, health, transportation, and communication, and perhaps you can understand why so many regard chemistry as the mother science, a solver of problems, and the hope of the world.

Conclusion

In conclusion, I wish to refer briefly to perhaps the most important element of the human system. The Bible tells the story of young King Solomon who was given the choice between wealth and wisdom. When he chose wisdom, God was so pleased that he gave Solomon not only wisdom but wealth as well.

'Consider the impact of chemistry on just five areas: energy, food production, health, transportation and communication, and perhaps you can understand why so many regard chemistry as the mother science, a solver of problems, and the hope of the world.'

As we seek material advancement, we should see that the final purpose of science and technology is not merely to add to the creature comforts of man but to help establish a universal and lasting peace among all the world's people. Indeed, this should be a major goal of all scientists, If we can, through chemistry and our professional institutions, cultivate the fields of human relationships and understanding, as well as create new energy sources, meet nutritional needs, produce better drugs, and create improved transportation and communication systems, then we will have created a better life for all of mankind.

It is a fact that men and women everywhere seek the same comforts, desire the same opportunities,

We will see major changes in the transportation field, nearly all of which will be chemically induced.

long for the same human dignity, and hope for a better world for their children and the generations to follow. In all respects, the things we hold dear and in common are greater than our differences. This should not be surprising. We are, after all, brothers and sisters within the human family. We do not have to be informed of this so much as to be constantly reminded. This membership in the human family implies world citizenship, a loyalty to the whole of mankind. Such loyalty need not conflict with traditional allegiances to family, community, or nation. It simply builds on and recognizes that traditional ties alone are not sufficient for the protection of the interdependent peoples of the world.

Over 65 wars since 1960, resulting in the death of over 10 million people in 49 countries, vast expenditures of human wealth and resources on military equipment, and the ever-present threat of nuclear annihiliation . . . all suggest we must be concerned with the attitudes and ideals of the family of man.

In my judgement, those with a knowledge of chemistry are in the very best position to contribute to the solution of these needs. But, if chemists are to play this essential role, they themselves must catch the vision of their special calling and then communicate this to a world that little understands or appreciates the vital function chemistry plays in enhancing the quality of life and in other ways meeting the worldwide needs of society. I believe the American Institute of Chemists is playing an important role in communicating this process. CHEMRAWN conferences are playing an important role in this process. The Pimentel Report, *Opportunities in Chemistry,* directed to those who are responsible for guiding science policy in the Congress and other governmental bodies, is playing a role. The Amercian Chemical Society's programme to increase public awareness of the importance of chemistry is playing a role.

But, we must do more, particularly on an international scale where the independence of people is becoming as important as the interdependence of the sciences. Theodore Roosevelt, once said: 'The only true solution of our political and social problems lies in calling everywhere for the spirit of brotherhood, of fellow feelings, and of understanding between man and man. Technology can help, but it alone cannot save us'.

Secretary General's Column

Tom West

IUPAC Secretary General Tom West reports on the Executive Committee meeting held in Athens earlier this year and discusses IUPAC's programmes on Chemistry and the Environment and Chemistry and Advanced Materials. He also comments on relations with the International Council of Scientific Unions.

This column is generally written after meetings of the Bureau, Executive Committee or the Council of IUPAC. Its purpose is to inform all who are active in the Union's commissions and committees about these discussions. Similarly, it informs our National Adhering Organizations (NAOs) and our largest group of adherents — the IUPAC affiliates.

However, it is my privilege also sometimes to discuss some of the background to IUPAC affairs, which are as yet below the horizon, although perhaps remotely sensed by antennae other than committee agendas and discussions. This I will do on this particular occasion which follows the most recent meeting of the Executive Committee in Athens on 28–29 April 1990.

1991 IUPAC General Assembly

The 1989 Council meeting in Lund decided to hold the next General Assembly in the Federal Republic of Germany. Following detailed investigations by Deputy Executive Secretary Ann Troughton, the Executive Committee accepted Hamburg University's Chemical Institute, on 7–15 August 1991 as the venue and timing for the 36th Assembly.

Details of the schedule of meetings, hotel accommodation and so on, will be circulated to all NAOs and participants this autumn. The pattern of

The 36th IUPAC General Assembly will be held in Hamburg, 7–15 August 1991.

the Assembly will be the same as before, with the commissions and committees meeting around 7–12 August, the Bureau on 12 and 13 August and the Council on 14 and 15 August.

As announced previously, the 33rd IUPAC Congress will follow on immediately in Budapest from 17 to 22 August. Organized by the Hungarian Academy of Sciences under the Presidency of Prof. Erno Pungor, the congress will have seven sections: (1) Perspectives of analytical chemistry; (2) Inorganic and physical chemistry; (3) Electrochemistry and electroanalysis; (4) Chemistry and biochemistry of biologically active organic compounts; (5) Biotechnology; (6) Chemistry of fats, and (7) Polymeric chemistry. This congress has already attracted much attention with some 1700 applications for further information following the issue of the first circular. We wish it great success.

Budapest, venue of the 33rd IUPAC Congress.

Meanwhile, our indefatigable Deputy Executive Secretary is already making advanced plans for the 1993 General Assembly to be held in Lisbon on the university campus, according to provisional acceptance by the Council at Lund. Meeting rooms have been inspected and hotels earmarked for accommodation. The favoured dates are again 7–15 August.

The venue for the 1993 IUPAC Congress was accepted provisionally as Beijing in the Peoples Republic of China. Even as I write this, our Executive Secretary 'Mo' Williams is visiting our Chinese colleagues there to discuss preliminary arrangements and to alert them to make a presentation of their proposals to the Bureau in September this year. At this time, we have no definite dates for the Beijing Congress.

Even more indefatigably and thinking still further ahead, Ann Troughton has visited sites and laid preliminary plans for the 1995 General Assembly, following an invitation issued well in advance by the UK. Again, the same period of 7–15 August is suggested by the Deputy Executive Secretary: the cathedral cities of Canterbury and Guildford are the favoured sites. I must hasten to stress, however, that the UK invitation for 1995 does not in anyway preclude the making or acceptance of proposals from other countries. Indeed, the Union has not yet solicited invitations to host the 1995 General Assembly and Congress.

Perhaps I should add here, for the benefit of readers, that general assemblies are the business meetings of IUPAC, where all its commissions, standing committees, divisions, sections and so on meet together biennially. On the other hand, the congresses are open meetings for the reading of scientific papers which are not necessarily connected with IUPAC's current programme. They are hosted and organized by one of the NAOs (i.e. member countries) of IUPAC in collaboration with the Bureau.

IUPAC and the environment

Extensive reference has been made earlier in these columns to the Union's new Chemistry and the Environment programme. As the Executive Committee learned in Athens, it is now gathering momentum. The first visible sign is the availability of an attractive booklet entitled *Chemistry and the Environment: the IUPAC programme*.

The Executive Committee was enthusiastic about this booklet and sent its warmest appreciation to Dr Michael Freemantle, in his capacity as Information Officer of the Union, for its compilation and production.

This interdivisional mission-oriented programme is being overseen by a Coordinating Committee on the Chemistry and the Environment programme (CCCEP). Immediate past-president of the Union, Prof. Valentin Koptyug (USSR), is the chief coordinator and there are seven topics in the

Free copies of booklet available to affiliates

Copies of the 64-page illustrated book on *The IUPAC programme on chemistry and the environment* have been distributed to members of IUPAC commissions and committees, national adhering organizations and other bodies associated with IUPAC.

A limited number of free copies are available to IUPAC affiliates who have completed and returned their yellow 1990 registration forms to the IUPAC Secretariat.

To apply for a copy, please write to the Affiliate Affairs Secretary at the IUPAC Secretariat.

programme with subcoordinators as follows: (1) Analytical procedures for determination of chemical substances and (2) Measurement of physico-chemical parameters — Prof. G. den Boef (The Netherlands), President of the Analytical Chemistry Division; (3) Transfer and transformation of chemical substances in the environment — Dr L. E. Coles (UK), President of the Applied Chemistry Division; (4) Toxicology of synthetic and natural substances — Prof. N. Montalbetti (Italy), President of the Clinical Chemistry Division; (5) Prevention of environmental pollution using chemical and biochemical methods — Prof. K. I. Zamaraev (USSR), immediate Past-President of the Physical Chemistry Division; (6) Chemical safety — Dr D. Wyrsch (Switzerland), Chairman of the Committee on Chemistry and Industry.

'Prevention of environmental pollution using chemical and biochemical methods' is one of six topics of the IUPAC Programme on Chemistry and the Environment.

CCCEP will use the booklet to further the contacts already established with ICSU–SCOPE (International Council of Scientific Unions — Scientific Committee on Problems of the Environment) and with UNEP (United National Environmental Programme). However, much more is needed to build on this promising start. Prof. Koptyug tabled the revised draft of a document he had prepared on 'Information on international organizations and programmes related to chemical and biochemical aspects of environmental problems'. This extensive compilation was welcomed by the Executive Committee and it was considered worthy of widespread dissemination. Even more interesting and significant for the future effort of CCCEP was Prof. Koptyug's draft document 'Possible liaisons of the IUPAC Environment Programme with other environmental programmes and proposals for new projects'.

Whilst a good start has been made in effecting coordination of existing divisional programmes on environmentally related topics which have evolved in an unstructured fashion hitherto, the last four words in the title of this draft document are particularly significant and merit some observations here.

First of all, however, it occurs to me that a Secretary General should occasionally be allowed to make some 'throw away' remarks, at least in this column, which is after all a non-statutory, self-imposed task. So let me say that I find CCCEP an indigestible collection of initials. So why not COCEP — Coordinating Committee for Chemistry and the Environmental Programme — as an acronym. Why not indeed!

Rocks ahead?

Well, now to a more serious comment on CCCEP and its future progression. Treasurer Anders Björkman has chosen wisely (in my opinion at least) to fund the initial surge of effort in CCCEP from the Union's assets, thus not upsetting the jealously guarded allocation of funds to the divisions. However, whilst this is an excellent principle for the additional effort and financial burden of starting up new operations, once CCCEP is underway its ongoing activities must be budgetted. A second new mission-oriented (horizontal) programme on advanced materials is about to be laid across the traditional vertical divisional programmes as an operating matrix and new projects are to be launched by CCCEP. All of these programmes require budgetting.

It is axiomatic that if new programmes are to be undertaken, older existing programmes will have to be heavily curtailed, even terminated in many places elsewhere within IUPAC, unless the NAOs agree to increase their financial input to the Union by a factor substantially higher than inflation. Elimination of programmes and commissions is a task that IUPAC has previously found singularly abhorrent.

Yet again, it has to be asked if mission-oriented programmes can be mounted entirely successfully through the present divisional structure of the Union. Such mission-oriented work will come and go, but it must be done much more expeditiously than have been the ongoing core activities of the traditional divisional programmes.

Furthermore, it may be that divisional personnel are not necessarily the best people to undertake the sort of tasks necessary in mission-oriented programmes. The Union will surely have to do more long-range thinking on how it may best be able to do its two types of core and mission work.

Chemistry and advanced materials

In Athens, the Executive Committee discussed the exploratory activity undertaken by several divisions of the Union towards setting up the second IUPAC mission-oriented programme 'Chemistry and Advanced Materials'. Whilst appreciating the preliminary work done, there was a general feeling amongst members of the Executive Committee that

When the IUPAC Executive Committee met in Athens, it favoured setting up a Coordinating Committee for Chemistry and Advanced Materials.

the proposals seemed to show that divisional commissions would tend to go their own way rather than become involved in a concerted overall programme. Therefore, the Executive Committee favours setting up a Coordinating Committee for Chemistry and Advanced Materials Programme (CCCAMP, or COCAMP in my terminology) along the lines of the now functioning CCCEP. The person to undertake this task of chief coordinator is currently being approached, and hopefully the group will be convened on the occasion of the Bureau meeting in Milan at the end of September.

In one of two ways CCCAMP faces a more difficult task than does CCCEP. The topic of chemistry and the environment is conceptually acceptable to almost every chemist, but CCCAMP may run up against industrial confidentiality problems in setting up the programme, as has COCI (Committee on Chemistry and Industry) in the past. Secondly, it will visibly increase non-core activity and the earmarking of funds that would otherwise have been more freely at the disposition of the divisions, thus arousing concern in the minds of colleagues intent on preserving the traditional divisional activity of IUPAC.

International Union of Materials Research Societies: a cloud on the horizon?

Recently, the Union has been approached by the Materials Research Society, which has its headquarters in Pittsburgh, USA, with queries on membership and regulating matters within IUPAC. The society is seriously considering setting up an International Union of Materials Research Societies, along the lines of IUPAC. This obviously has implications for discussions on our present advanced materials programme.

More seriously, however, it must be of concern to IUPAC as a whole. It is a matter of history that IUPAC used to have biochemistry as one of its main divisional-type activities. IUB is now a separate and competing international scientific union. There are also chemists engaged in geochemistry, atmospheric chemistry, water chemistry, cosmochemistry and so on in other international scientific unions, where they make notable contributions to earth-, space- and bio-sciences in ICSU programmes largely and sadly to the exclusion of IUPAC.

It must be borne in mind too that, in many advanced countries, the materials science industry now has a greater financial turnover than the traditional chemical industry. Clearly, there is a cloud or two on the horizon for the future governance of IUPAC, which must exercise the minds of those in charge of chemistry's international union.

Membership of IUPAC

In the previous Secretary General's column, I referred to problems of non-payment of annual national subscriptions to IUPAC. Unhappily, the Union has now had to accept the loss of Belgium for this reason, due to outstanding subscriptions for 1985 and 1988. This fortunately will have no immediate effect on the position of Belgian chemists who are presently involved in IUPAC activities. However, it means that they will not be re-elected when their present period of membership is completed.

In addition, none of the Belgian affiliate members can be promoted above the level of working-party membership as long as Belgium is not a full member of IUPAC. We can but hope that our Belgian colleagues may yet be able to persuade their funding body to resolve this unhappy state of affairs. Belgium has long played a prominent part throughout all of IUPAC's activities. We would all be losers by its absence.

An application for observer country status was received from the Chemical Society of the South Pacific (CSSP). The Executive Committee considered CSSP to be a regional rather than national organization, and decided rather to recommend it for Associated Organization status in common with other regional organizations.

Affiliate affairs

The Council in Lund agreed to set up a Committee on Affiliate Membership (CAM) to look after affiliate affairs within the Union. In particular, CAM will consider ways and means of enhancing the Affiliate Membership Programme (AMP) and improving opportunities for affiliates within the limits allowed by the present Statutes and Bylaws. Recommendations for membership of CAM, chosen from the elected members of Bureau according to the wishes of Council, were made by the Executive Committee. However, since the acceptance of those members is not yet known, I shall not give their names at this stage.

A meeting of CAM has been scheduled at the time of the Bureau meeting in September, and a second meeting will take place in the early stages of the 1991 General Assembly.

There is no doubt that members of CAM would welcome observations on AMP and on the roles that affiliates might play in the Union. I already have one or two useful suggestions from earlier correspondence. As chairman-designate of CAM, I would welcome many more suggestions to table at the next meeting of CAM and I urge affiliate members to write to me at the Oxford Secretariat address given on the inside cover of *CI*.

'I would welcome suggestions to table at the next meeting of the Committee on Affiliate Membership and I urge affiliate members to write to me at the Oxford Secretariat address given on the inside cover of CI.'

Relations with ICSU

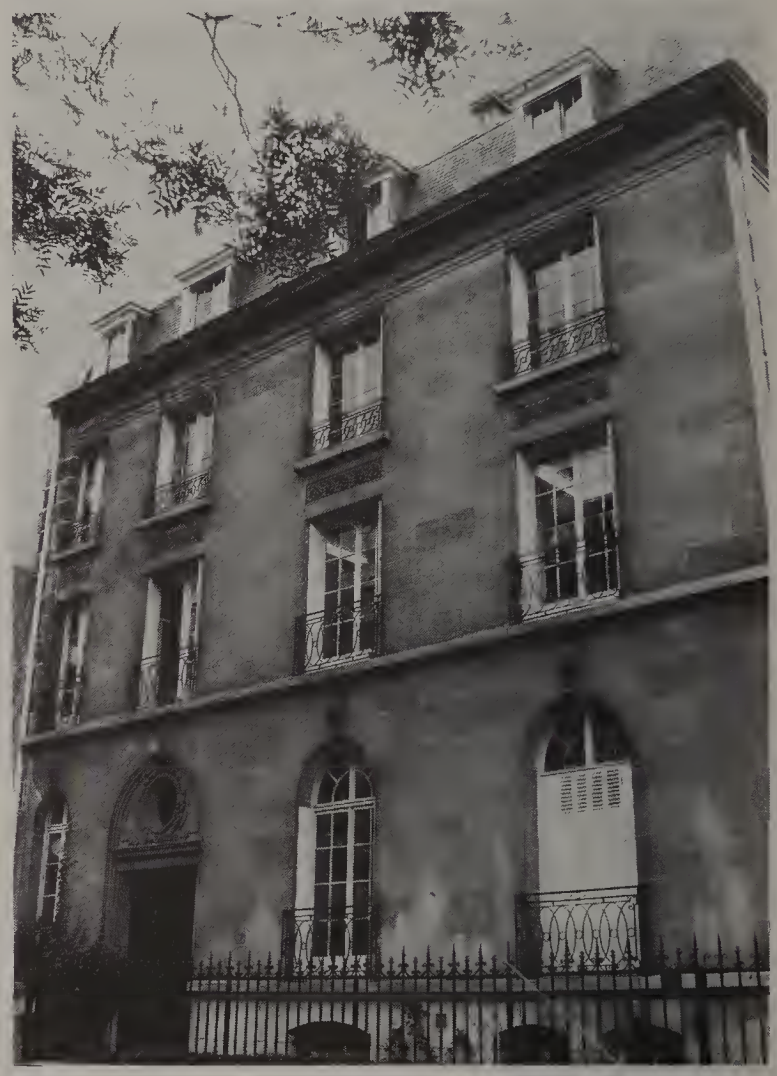
Together with other international scientific unions, IUPAC is a member of ICSU. The latter organization represents all these unions on UN committees and it acts as a forum for discussion of interdisciplinary affairs between the unions. It receives grants for science from UNESCO, UNDP and so on for interdisciplinary activities, such as those related to the environment and undertaken by SCOPE.

Also, ICSU obtains a block grant from UNESCO, which it distributes in open competition to its member unions. In general, it acts as the body representing the social conscience of science, science education, free circulation of scientists, and ethical matters, for example.

Recently, however, we have become concerned that ICSU seems to be directing more of its energy and resources into its scientific committees, many of which have generally been allowed to assume a life of their own, increasingly independent of the founding scientific unions. The 'U' in ICSU stands for Unions, but ICSU seems to be reverting more to the research council role of its predecessor organization, the International Research Council (IRC). These increasingly independent scientific committees are tending to behave analagously to the divisions within IUPAC. At a time when the tranche of funds available for scientific work is decreasing relative to other activities, this must be a serious concern to IUPAC and its fellow unions.

ICSU is, of course, a serious competitor with the unions for annual subscriptions from the same national academies and research councils in most countries. In my own country, the subscription to ICSU is considerably greater than that to any of the scientific unions. It seems probable that this may also apply for many other countries. Additionally, several of the scientific committees of ICSU receive some annual subscriptions from national academies, though usually the sums of money involved are relatively small.

Finally, in this context, IUPAC also pays an annual subscription (about USD 12 000) to ICSU — which is subsequently repaid to IUPAC! You may ask why we pay it then. Well, logically it means we are members and have a say in the General Committee and General Assemblies of ICSU. Moreover, it is good to have it repaid rather than kept.



ICSU Headquarters in Paris. IUPAC is 'concerned that ICSU seems to be directing more of its energy and resources into its scientific committees, many of which have generally been allowed to assume a life of their own'.

The independence of the International Geosphere–Biosphere Programme, one of the most recently formed scientific committees of ICSU, has caused much grave concern in the Executive Committee and Bureau of IUPAC. This is because a very large proportion of IGBP's activities centre around chemistry. Yet IUPAC has no representative on the governing body of IGBP. Some reasons have been advanced why IGBP should be independent of the unions, but they are not convincing or particularly valid in our opinion.

ICSU's newest Scientific Committee on Biotechnology (COBIOTECH) was set up just a few years

ago. IUPAC was invited to participate as a founding union because of its own existing activities in biotechnology, namely, the work of our Commission on Biotechnology (VI.2). We participated willingly with the three other (bio)unions. The chairman of Commission VI.2 became IUPAC's representative on the founding group of COBIOTECH.

Suddenly, however, we find that our Union no longer has a representative on COBIOTECH's more recently formed 'Steering Committee'. Our former Union representative is a member, but purely in a personal capacity and as a representative apparently of his own country. According to the new constitution of COBIOTECH, there is to be no union representation and we have been informed that the new representative we had nominated earlier may now attend the 'General Assembly' of COBIOTECH *as an observer*.

The chief duty of IUPAC's official representatives at sponsored symposia is to convey the Union's greetings at the opening ceremonies.

We have accordingly informed ICSU of our disquiet, and that we find this new state of affairs unacceptable. Indeed, we remain to be convinced that COBIOTECH is big enough to warrant the bureaucracy of a steering committee and a general assembly. In any event, our position is that the four funding unions should retain their positions as voting members of COBIOTECH. Any other alternative belays the spirit of inter-union collaboration and interdisciplinary effort for which ICSU stands and out of which COBIOTECH emerged.

We hope that our concerns, expressed in a constructive and friendly, though firm, way to ICSU, will receive sympathetic consideration. I hope that I, or my successor, will in due course be able to report better news on COBIOTECH in a future SG column.

Official representatives on other bodies

Official representives of the Union are appointed to IUPAC-sponsored symoposia and to various other international scientific organizations, for example, ICSU–SCOPE, with which our Union has agreed common interests. In the case of IUPAC-sponsored symposia, the representative's chief duty is to convey the Union's greetings at the opening ceremony. At the end of the symposium the representative presents a written report on the scientific quality and organization of the meeting. The Secretariat adequately briefs such representatives on their duties and monitors the reports.

However, there now appears to be a need to reassess our position in appointing representatives to other organizations. A representative on a scientific committee, for whatever subject or topic X, must be in the position that he/she can speak with the authority of his/her expertise on X. Also he/she must be familiar with the views and current thinking and concerns of the Bureau and Executive Committee. In this way, he/she can participate fully in the discussions of the external organization to which he/she has been appointed and have the opportunity to influence its policy in the best interests of IUPAC and to offer cooperation by the appropriate IUPAC body.

In the past we have not considered this factor sufficiently, and have relied on voluntary reporting back. Frequently, reports have not been forthcoming and we have been left without information. However, even when written reports have been forthcoming, the time-lag between meetings of IUPAC – or the committee on X – has meant that opportunities have been missed and our Union has appeared to others to be ineffective or isolationist. In the present rapidly changing and intensely competitive scene of international science, we must henceforth seek to do better.

History of IUPAC: *'Le plus ça change. . .'*

In previous SG columns I have referred to the *History of IUPAC* currently being compiled for the Union by Mr R. W. Fennell, a former Secretary of the Analytical Chemistry Division, erstwhile mandarin of the British Scientific Civic Service and, now, historian extraordinary of IUPAC. Thus far, based on his own researches in the dusty archives at the IUPAC Secretariat and a former unpublished compilation of the late Prof. Stig Verbel (Denmark),

Reger Fennell: erstwhile mandarin and historian extraordinary.

Roger Fennell has completed the first four chapters. These cover the period from IUPAC's emergence as a predecessor international society for chemistry, in the closing two decades of the previous century, up to the outbreak of the Second World War.

Against the backdrop of flashes of dry humour from its author, these four chapters, which I have been privileged to see in manuscript, present a fascinating account of the emergence of modern-day IUPAC. And yet, as our French colleagues so aptly say in their language 'some things never change'. The publication of this book will be a landmark for the Union, and it should prove to be compulsive reading for all who have served in IUPAC and for those chemists who, in the future, will be fortunate enough to do so.

Commission & Committee News

Characterization chaos with liquid crystal polymers

The 15th meeting of the Commission on Polymer Characterization and Properties (IV.2) was held in Montreal, Canada prior to the 33rd International Symposium on Macromolecules.

Twelve members of the commission heard Prof. Bob Lenz reveal the critical need for standardization of characterization methods for liquid crystal polymers. The first year's work of his working party had produced a wealth of results from 20 different laboratories world-wide on four liquid crystal polyesters. These laboratories cover 10 countries and are split 60:20:20, university:government: industry.

The melting transitions shown by DSC (differential scanning calorimetry) were not too different, but enthalpy measurements were in total disagreement — there were no two polarized light micrographs alike. Although TGA measurements (thermogravimetric analysis) appeared to be more standardized, the results were not very meaningful. The WAXD (wide angle X-ray diffraction) work gave little chance of comparison.

In the next year the major actions will be to standardize each of these techniques, especially in terms of sample preparation for test, so that results from all laboratories can be comparable.

That this chaos should occur was no surprise to the chairman of the other working parties. The oldest established, on 'Structure and Properties of Commercial Polymers' and 'Molecular Characterization of Commercial Polymers' have always needed to spend significant effort on such standardization at the early phases of any project involving techniques not used in previous projects.

Both of these working parties continue to flourish with a number of active projects in progress and publications being made. They are strongly supported by industrial members, but in the case of 'Molecular Characterization' not equally supported by academic membership.

Four papers on continuous carbon fibre PEEK composites are in their final stages, from the first major cooperative world-wide study of the properties of this advanced material. Work on discontinuous fibre thermoplastic composites is well underway and is likely to be extended from mechanical properties to their rheology.

Two reports are underway on the molecular characterization of LLDPE (linear low density polyethylene) and work on the measurement of the molecular weight of VHMPE (very high molecular weight polyethylene) are nearing successful completion. New projects on molecular characterization of bi-modal HDPE (high density polyethylene) and polycarbonate are being considered.

A new study, by the Working Party on Thermal Properties, looks set to produce a definitive document on the use of DSC for studying the cure of epoxy thermosetting resins, and the interpretation of such data.

The formation of the Working Party on Polymer

Networks has proved invaluable in making possible a whole range of cooperative projects, previously identified by the range of international workers but not previously realized. This is a prime example of the assistance that IUPAC can give to the furthering of research internationally. Papers are in progress on the prediction of gel points using Monte Carlo simulations, and a large range of studies are proceeding, for example: experimental work on PU (polyurethane) network samples; FTIR (Fourier Transform Infra-Red) and chemical methods of measuring conversion of siloxane networks; sol–gel transition and the formation and properties of industrially relevant networks of defined structures.

An excellent overview of polymer activities and the laboratories involved in India was given by the national representative for India, Prof. Pushpa Bajaj.

There is continuing strong activity by the other working parties on 'Interaction of Polymers with Living Systems' and 'Modelling of Polymerization Kinetics and Processes'.

John M. Cann

Quantities and units in clinical chemistry

The Commission on Quantities and Units (VII.2) of the Clinical Chemistry Division held its ordinary 1990 commission meeting in Geneva, Switzerland from 25 to 28 February 1990 at the headquarters of the World Health Organization (WHO).

Geneva was chosen for the venue in order to facilitate a joint meeting with WHO officers for exchange of views and information on tasks and problems of mutual interest to the commission and selected departments of WHO — as well as continue with normal commission work on projects and other activities. The meetings were arranged in cooperation with the WHO Medical Officer Dr Claus Heuck (Health Laboratory Technology).

One achievement of the meeting was a decision on direct exchange of information between groups on new adopted terminology related to components

View of the WHO headquarters building in Geneva – venue of the Commission VII.2 meeting. ***(Photo by J. Germain courtesy WHO.)***

and quantities, for example, on terminology for therapeutic substances analysed in clinical laboratories. Another important achievement was the establishment of a consultant working group on WHO biological reference materials for diagnostic use and its relation to approved recommendations on quantities and units.

The commission planned another meeting for July 1990 to be held in San Francisco under the auspices of the International Federation of Clinical Chemistry (IFCC).

Mogens Lauritzen

Nomenclature for detection of radiation

Members of the Working Group on the Nomenclature for Detection of Radiation met in the Chemistry Department of the Universität Gesamthochschule Essen, FRG, to discuss the revision of the 5th draft of the document 'Detection of radiation' prepared at the Lund General Assembly in August 1989. The document is Part XI of the series of nomenclature documents prepared by the Commission on Spectrochemical and Other Optical Procedures for Analysis. The updated version, draft 6, will be submitted for approval at the next commission meeting.

Allan M. Ure

Provisional Recommendations

Nomenclature, symbols, units and their usage in spectrochemical analysis – XII. Terms related to electrothermal atomization

Terminology for electrothermal atomization is recommended and its use illustrated mainly in the application of electrothermal atomization to atomic absorption spectrometry. The terms, symbols and abbreviations required for the description of atomizers, for the processes involved in electrothermal atomization and in their analytical use are prescribed. An index of terms is included.

Comments on the document should be sent by 30 June 1991 to: Dr T. A. M. Ure, Department of Pure and Applied Chemistry, Thomas Graham Building, University of Strathclyde, 295 Cathedral Street, Glasgow G1 1XL, UK.

Addresses of National Regional Centres

If you would like to comment on provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the Secretariat. The most up-to-date list of national/regional centres is shown below.

Argentina
Dr J. Mazar-Barnett,
Asociación Química Argentina,
Sánchez de Bustamente 1749,
Buenos Aires,
Argentina.

Asia (Australia, Bangladesh, Hong Kong, Indonesia, Iraq, Korea, Malaysia, Nepal, Philippines, Singapore, Sri Lanka, Thailand)
Professor Sang up Choi,
c/o Korean Chemical Society,
35 5-KA Anam-Dong,
Sungbuk-Ku,
Seoul 136-075,
Korea.

Bulgaria
Professor O. Peshev,
Bulgarian Academy of Sciences,
Institute of General and Inorganic Chemistry,
1040 Sofia,
Bulgaria

Canada
Professor J. ApSimon,
Department of Chemistry,
Carleton University,
Ottawa, Ontario K1S 5B6,
Canada.

China/Beijing
Professor Cui Meng-Yuan,
Chinese Chemical Society,
POB 2709,
Beijing,
China.

China/Taiwan
Professor F. C. Chen
Department of Chemistry,
National Taiwan University,
POB 30-373,
Taipei 107,
Taiwan.

Czechoslovakia
Dr J. Kahovec,
Ústav makromolekulární chemie,
Československá nám 2,
CS-16206 Prague 616
Czechoslovakia.

France
Mme L. Ter Minassian-Saraga,
45 rue des Saints-Péres,
UA 400,
75270 Paris Cédex 06,
France.

Federal Republic of Germany
Dr Eva Wille,
Journal Department Manager,
VCH Verlagsgesellschaft,
Postfach 1260/1280,
D-6940 Weinheim,
Federal Republic of Germany.

German Democratic Republic
Professor H. Schick,
Zentralinstitut für Organische Chemie der Akademie der Wissenschaften der DDR,
Rudower Chaussee,
DDR-1199 Berlin-Adlershof,
German Democratic Republic.

Hungary
Professor E. Pungor,
Altalános és Analitikai Kémiai Tanszék.
Budapesti Müszaki Egyestem,
Gellért tér 4,
H-1521 Budapest X1,
Hungary.

India
Dr V. C. Vora,
Indian National Science Academy,
Bahadur Shah Zafar marg,
New Delhi 110002,
India.

Italy
Professor G. Scorrano,
President Società Chimica Italiana,
Viale Liege 48,
00198 Roma,
Italy.

Japan
Dr A. Nakanishi,
Executive Director,
Chemical Society of Japan,
1-5 Kanda Surugadai,
Chiyoda-ku,
Tokyo 101,
Japan.

The Netherlands
Ir. E. J. de Ryck van der Gracht,
Koninklijke Nederlandse Chemische Vereniging,
Postbus 90613,
2509 LP Den Haag,
The Netherlands.

Poland
Professor O. Achmatowicz Jr.,
The Polish Chemical Society,
ul; Freta 16,
00-22 Warszawa,
Poland.

Sweden
Dr K. Samuelsson
TCO-Tjänstedata AB,
Tunnelgatan 17,
S-105 32 Stockholm,
Sweden.

Republic of South Africa
Professor J. R. Bull,
Department of Organic Chemistry,
University of Cape Town,
Rondebosch 7700,
Republic of South Africa.

UK
Dr A. D. McNaught,
The Royal Society of Chemistry,
Thomas Graham House,
Science Park,
Milton Road,
Cambridge, CB4 4WF,
UK.

USA
Dr Marianne Brogan,
Journals Department,
American Chemical Society,
2540 Olentangy River Road,
POB 3330, Columbus,
Ohio 43210,
USA.

USSR
Professor G. B. Bokij,
Commission on Nomenclature,
National Committee of Soviet, Chemists,
Academy of Sciences of USSR,
Kodygin Street 4,
SU-117977 Moscow V-334,
USSR.

Nomenclature, symbols, units and their usage in spectrochemical analysis — XIII. Terms related to chemical vapour generation

The terms required for the description of chemical vapour generating systems and processes used for the introduction of sample material in optical atomic spectrometry are prescribed. The terms include those relevant to the generation of volatile halides, mercury vapour and the halogens for determination by such spectrochemical techniques. The terminology recommended embraces the gas flow systems involved and the sampling and excitation sources used, in particular, with hydride generation techniques. An index of terms is included.

Comments on the document should be sent by 30 June 1991 to: Dr T. A. M. Ure, Department of Pure and Applied Chemistry, Thomas Graham Building, University of Strathclyde, 295 Cathedral Street, Glasgow G1 1XL, UK.

IUPAC seeks your comments

All comments on the above provisional recommendations on nomenclature and symbols are welcome and will be taken into consideration. The final revised versions are published in *PAC* and synopses of these are published in *CI* as recent reports.

Recent Reports

In this section we publish summaries of the most recent IUPAC recommendations on nomenclature and symbols and technical reports. The full texts of these recommendations and reports are published in *PAC*.

Quantitative analysis of a multicomponent silicate glass by electron microprobe

A standard glass sample denoted by the National Institute of Standards and Technology as K-412 was analysed using electron microprobe by an international collaborative team. The results of quantitative determination of the oxide glass components are compared and the deviations from the standard values are calculated. Also methods of glass surface treatment, conditions of quantitative determination and procedures used for evaluation of results are summarized.

This report was prepared for publication by J. Matoušek, V. Hulínský, R. Metselaar and J. Corish, Commission on High Temperature and Solid State Chemistry, Inorganic Chemistry Division, and published in PAC, *Vol. 62, No. 6, 1187–92, 1990.*

Nomenclature for sampling in analytical chemistry (Recommendations 1990)

The IUPAC definition of the term SAMPLE appearing in the *Compendium of analytical nomenclature, definitive rules 1987* is 'the actual material investigated, whether diluted or undiluted'. Although many colloquial analytical chemical communications use this definition, it frequently results in confusing, ambiguous, and contradictory usages. The term has been used in at least 17 ways in IUPAC documents and other scientific literature. Such ubiquitous applications often do not permit analysts to orient themselves as to where they are in the sampling and analytical scheme. A remedy is proposed, based upon the vocabulary of the International Organization for Standardization (ISO), that requires the following.

(1) Confine the use of the term SAMPLE to its statistical concept: If a potential exists for a sampling error due to the heterogeneity of a population, the term SAMPLE with an appropriate modifier to indicate its position in the sampling scheme should be used (i.e. increment, primary sample, secondary sample, etc., laboratory sample, test sample, test portion).

(2) Once analytical work begins by measuring the test portion, avoid the term SAMPLE; use TEST or UNKNOWN as the modifier as in TEST

Ubiquitous applications of the term SAMPLE often do not permit analysts to orient themselves as to where they are in the sampling and analytical scheme. ***(Photo courtesy Lilly Industries Ltd.)***

SOLUTION, TEST EXTRACT. For the common step usually designated as PREPARATION OF SAMPLE in methods of analysis, use more specific terms, such as PURIFICATION, SEPARATION, or ISOLATION [of analytes].

(3) Use the term SPECIMEN for a sample from a parent population that changes with time, as in living organisms, circulating blood, or a flowing river. In this case the phenomenon under study and the sampling error are confounded in such a way that they can not be separated.

This report was prepared for publication by William Horwitz, Commission on Analytical Nomenclature, Analytical Chemistry Division, and published in PAC, *Vol. 62, No. 6, 1193–208, 1990.*

A synopsis of the report was published as Provisional Recommendations in CI, *Vol. 8, No. 4, 21, 1986. The Provisional Recommendations were sent to national/regional centres for distribution to interested chemists. Comments on the recommendations received before the end of March 1987 were taken into consideration when preparing the final report.*

Recommended methods for fluorescence decay analysis

This report reviews methods of analysis of fluorescence decay data collected by frequency and time domain techniques. The methods are assessed critically and recommendations are made to assist users to determine the method appropriate for selected analyses. The review covers data collection methods and their pitfalls, data analysis methodology and techniques used to judge goodness to fit.

This report was prepared for publication by David F. Eaton, Commission on Photochemistry, Organic Chemistry Division, and published in PAC, *Vol. 62, No. 8, 1631–48, 1990.*

Problems of the environment

Recent SCOPE reports have focused on biological invasions, the global biogeochemical sulfur cycle, injury from chemical accidents and toxicity texts for non-genotoxic effects.

SCOPE is the Scientific Committee on Problems of the Environment. It is one of a number of committees established by a non-governmental group of scientific organizations, the International Council of Scientific Unions (ICSU). Currently, representatives of 35 member countries and 20 international scientific bodies participate in the work of SCOPE, which directs particular attention to the needs of developing countries.

SCOPE was established in 1969 in response to the environmental concerns emerging at the time; ICSU recognized that many of these concerns required scientific inputs spanning several disciplines and ICSU unions. SCOPE's first task was to prepare a report on *Global environmental monitoring* (SCOPE 1, 1971) for the United Nations Stockholm Conference on the Human Environment. Since then over 40 SCOPE reports on environmental topics have been published.

The mandate of SCOPE is to assemble, review, and assess the information available on man-made environmental changes and the effects of these on man; to assess and evaluate the methods of measurement of environmental parameters; to provide an intelligence service on current research; and by the recruitment of the best available scientific information and constructive thinking to establish itself as a corpus of informed advice for the benefit of centres of fundamental research and of organizations and agencies operationally engaged in studies of the environment.

Biological invasions

The invasion of natural ecosystems by animals, plants and micro-organisms has become a topic of major concern among environmental scientists. *Biological invasions: a global perspective* (SCOPE 37) focuses on the phenomenon of biological invasions, stressing a global appraisal of the problem, rather than local patterns. It discusses the damage which often accompanies an invasion such as the serious problem of the extinction of species and the replacement of entire ecosystems.

This volume represents the culmination of activity resulting from a SCOPE programme on the 'Ecology of biological invasions', which was concerned with species that have been successful invaders in non-

SCOPE 39 considers the evolution of global geochemical cycles that have not been examined before.

agricultural regions and emphasized those which have disrupted ecosystem function.

SCOPE Report 37: Biological invasions: a global perspective *is edited by J. A. Drake, H. A. Mooney, F. di Castri, R. H. Groves, F. J. Kruger, M. Rejmànek and M. Williamson and is published by John Wiley & Sons, Chichester, UK, 1989. xxiv + 525 pp. ISBN 0 471 92085 1. Price GBP 66.00/USD 132.85.*

Evolution of the global biogeochemical sulfur cycle

SCOPE 39 is the report of the second stage of activity of the SCOPE International Sulphur Unit set up in 1982 according to the decision of the Scientific Advisory Committee on the Biogeochemical Cycles. Upon the completion of the first stage of work and publication of *The global biogeochemical sulphur cycle* (SCOPE 19, 1983) it was decided to continue the work on the generalization of the global sulfur cycle data and to concentrate on the two problems relatively insufficiently touched upon in SCOPE 19.

A SCOPE international workshop which considered using stable isotopes in the assessment of natural and anthropogenic sulfur in the environment was held in September 1983 at the Institute of Biochemistry and Physiology of Micro-organisms in Pushchino (Moscow region), USSR.

In the summer of 1984, the Tallinn Botanical Garden of Estonia Academy of Sciences hosted the international workshop on 'Evolution of the global biogeochemical sulfur cycle'. Thirty scientists of different specialities representing universities and institutes of 13 countries of Europe, Asia, North America and Australia and 20 Soviet researchers took part in the work. The presentations of the participants of the Tallinn workshop and their comments in the working groups form the foundation of this volume.

The volume has two important features. First, it considers the evolution of global geochemical cycles that have not often been examined before. Secondly, it examines current anthropogenic perturbations of the sulfur cycle.

Part I of the book presents a picture of the sulfur cycle in the Precambrian era and some dynamic models of the cycles from the Cambrian through to the Neogene eras. The quantitative nature of the models makes it possible to single out unusual periods in the history of the sulfur cycle which appear to be related to evolutionary changes in the biosphere. Part II considers the evolution of the sulfur cycle in the Holocene era, that is the last 10 000 years.

SCOPE Report 39: Evolution of the global biogeochemical sulphur cycle *is edited by Peter Brimblecombe and Alla Yu. Lein and published by John Wiley & Sons, Chichester, UK, 1989. xxxiv + 241 pp. ISBN 0 471 92251 X. Price GBP 56.95/USD 114.60.*

Methods for assessing and reducing injury from chemical accidents

SCOPE Report 40 (IPCS Joint Symposia 11, SGOMSEC 6) on *Methods for assessing and reducing injury from chemical accidents* is the result of a workshop held in New Delhi, India, from 27 January to 2 Febrary 1987. The study was carried out by the Scientific Group on Methodologies for the Safety Evaluation of Chemicals (SGOMSEC).

SGOMSEC operates under two separate sponsors: (1) the International Programme on Chemical Safety (IPCS) within the World Health Organization (WHO), which has the cooperation of the United Nations Environmental Programme (UNEP), and the International Labour Organization (ILO); and (2) SCOPE. The group undertakes the examination of methodologies for the evaluations of injury to humans and non-human biota where the methods are deemed sufficiently insecure at this time to require examination as to how they can be improved through research.

The workshop was held in India at the invitation of Dr Krishna Murti, Chairman of the Indian National Committee on Bhopal Gas Leakage. Although stimulated by the Bhopal accident, that unfortunate disaster receives only limited attention in this report, rather it is directed to future chemical accidents wherever they may occur, be they in industrialized or developing countries.

The joint report published in SCOPE 40 includes chapters on: The assessment and control of chemical accidents; Health assessment and medical response; Ecological aspects; Disaster emergency planning.

In this context, Bhopal is one of a series of case studies which the workshop examined in making its proposals for mitigating the adverse effects of chemical accidents. Prevention of such accidents is, of course by all means, the most desirable approach to avoiding the injuries and devastation that can follow such occurrences. However, prevention is, in most cases, site and agent specific, and is thus beyond the scope of this study. Nevertheless, as the preface of this report points out, other groups including IUPAC's Committee on Chemistry and Industry (COCI) are undertaking such preventive approaches.

Despite the absence of extensive preventive approaches in this effort, this report includes many things which can be done inside the plant and in the way of community and public agency preparation which should serve to minimize and limit the injurious effects of an accident.

The focus here is on chemical accidents, oil spills are not covered, nor are radiation accidents. There are five chapters in the joint report. Chapter 1 deals with the scope and context of the chemical accident. Chapter 2 covers the assessment, extent, engineering aspects and restriction of spread; Chapter 3 covers health assessment and medical response; Chapter 4 deals with adverse ecological effects including the utility of using ecological effects as a way of defining the spread of the chemical agents; Chapter 5 deals with disaster emergency planning which needs to be in place before the accident occurs.

SCOPE 40 (IPCS Joint Symposia 11, SGOMSEC 6): Methods for assessing and reducing injury from chemical accidents *edited by Philippe Bourdeau and Gareth Green and published by John Wiley & Sons, Chichester, UK, 1989. xxv + 303 pp. ISBN 0 471 92278 1. Price GBP 58.65/USD 118.05.*

Short-term toxicity tests for non-genotoxic effects

SCOPE 41 (IPCS Joint Symposia 8, SGOMSEC 4) on *Short-term toxicity texts for non-genotoxic effects* is the report of another study undertaken by SGOMSEC (see above).

The study is based on a workshop held in Ottawa, Canada, 13–16 August 1984. It was undertaken with the view that something less than full scale *in-vivo* studies may have useful predictive value in characterizing the toxicity of chemicals of public health and ecological importance.

It was not anticipated that this exploratory study would necessarily reveal techniques ready at this time to serve as substitutes for classical toxicological and environmental assessments. However, in some instances it has been possible to identify experimental approaches to the resolution of specific questions relating to the adverse effects of chemicals and thus supplement classical *in-vivo* approaches. Not surprisingly, in some cases there were substantial limitations in the information that could be secured in simplified systems.

The issue was dealt with through a series of inquiries; cell cultures involving primarily undifferentiated cells; a systematic examination of short-term tests of the functional ability of organs or components thereof; and a series of systems — haematopoietic, immunological, reproductive, and so forth — were also examined.

In each such instance, experts in the respective fields undertook the preparation of background papers exploring the presently available information. At the workshop, these contributors, together with other experts, prepared a joint report by collectively examining each of the various topics.

Part A of SCOPE 41 is the joint report and Part B the contributed papers. The volume examines the ability of short-term texts to provide useful supplementary information for the evaluation of the effects of chemicals in mammalian systems and in non-human biota.

SCOPE 41 (IPCS Joint Symposia 8, SGOMSEC 4): Short-term toxicity tests for non-genotoxic effects *was edited by Philippe Bourdeau, Emmanuel Somers, G. Mark Richardson and J. R. Hickman and published by John Wiley & Sons, Chichester, UK, 1990. xxxii + 353 pp. ISBN 0 471 92506 3. Price GBP 69.96/USD 140.80.*

Publications

Automation and new technology in the clinical laboratory

The recently published volume on *Automation and new technology in the clinical laboratory* is the proceedings of the IUPAC-sponsored 3rd International Congress on Automation and New Technology in the Clinical Laboratory, held in Kobe, Japan, 5–8 September 1988. The volume was edited by IUPAC affiliate Kiyoshi Okuda (Osaka City University Medical School, Japan). Okuda was also Chairman of the Congress Organizing Committee.

In the preface, Okuda comments that much of the recent progress in medical science and medical care can be attributed to developments in laboratory medicine. Usually, an advance in methodology leads to developments in the field of science; past innovations in laboratory medicine have always been supported by improvements in methodology achieved through the active introduction, understanding, and applications of technology from chemistry, physics, biology and related fields. For the future development of laboratory medicine, continued close interaction with the new technologies of these related fields is essential.

Okuda also presented papers on 'Developments in dry chemistry, and the situation in Japan' and 'Correlation of metabolites in the saliva and blood'. In the latter paper he pointed out that there is increasing emphasis on saliva as a biological specimen for laboratory testing because of advantages of saliva over blood samples. Okuda suggested that salivary levels of some metabolites are indicators of blood levels. He has assessed the

Rapid turnaround from sample drawn to result is one of the factors driving the decentralization of testing of clinical samples. Test sites now include the hospital ward and emergency room. (*Photo courtesy Unesco.*)

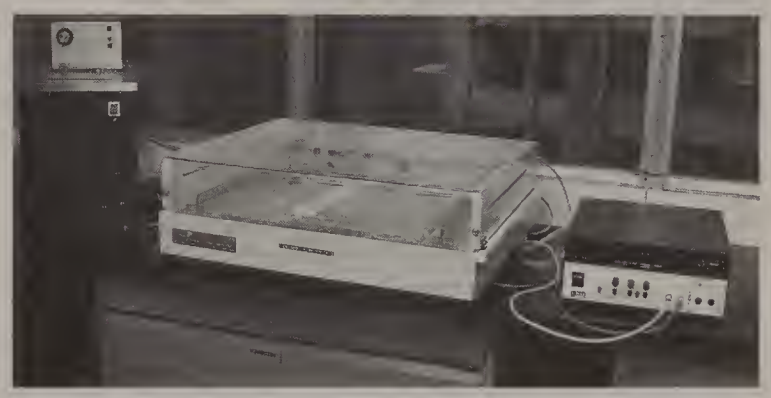
relationship between the levels of some metabolites in saliva and blood.

In his paper on 'New directions of decentralization', Marvin A. Genshaw (Miles Inc., USA) stated that decentralization of testing of clinical samples is being driven by a number of factors. Among these are the availability of new technologies for use in the small laboratory, the desire or need for a rapid turnaround from sample drawn to result, and fiscal considerations. Test sites now include the hospital ward and emergency room, small clinic, doctor's office, and even the patient's home.

Affiliate John Savory (University of Virginia, USA) was one of several authors of a paper on 'Robotics in clinical laboratory medicine'. Savory was Chairman of the IUPAC Commission on Toxicology. F. William Sunderman (University Connecticut School of Medicine, USA), who is a past-president of the Clinical Chemistry Division and also an affiliate, co-authored a paper on 'Coupled LC–AAS system for trace metal analysis of biological samples'. The other three authors were from the Shinshu University School of Medical Technology, Matsumot, Japan.

In another paper, Carl A. Burtis (Oak Ridge National Laboratory, USA) reviewed 'Recent technological developments and their impact on laboratory automation'. He pointed out that technological developments over the past 15 years have resulted in a new generation of analytical systems in which all the instrumental, methodological, and reagent components are integrated into a single self-contained unit. Such systems (termed 'closed') are highly automated, and many of the analytical operations that once required human intervention or labour are now performed by the system. The availability of these new systems minimize the need for human involvement in the analytical process and will have a significant impact on how the clinical laboratory of the future is staffed, equipped, organized and operated.

Electrophoresis was one of a number of techniques discussed in papers presented at the congress. For example, Kazusuke Takeo (Yamaguchi University School of Medicine, Japan) delivered a lecture on 'Separation of antibody by affinity gel electrophoresis'. He has developed new types of two-dimensional electrophoresis measuring the difference in the charged state of proteins in the first direction and the difference of their biological activity in the second direction. Thus, rabbit anti-DNP antibodies were separated in the first direction by isoelectric focusing and in the second direction by affinity electrophoresis. By this method, purified rabbit anti-DNP antibodies have been separated into several hundred IgG spots. Each spot appears to be homogeneous.



The use of electrophoresis in the clinical laboratory was the subject of several papers at the Kobe congress. *(Photo courtesy Lilly Industries Ltd.)*

In their paper on 'Pulsed field gel electrophoretic snapshops on chromosomes' Cassandra L. Smith, Jose P. Abad and Guy Condemine (Columbia University, USA) indicated that pulsed field gel electrophoresis and large-scale DNA technology allow the analysis and manipulation of molecules that range in size up to 10 million base pairs. This means that it is now possible to carry out molecular studies on whole chromosomes from virtually any organism. These techniques have revolutionized studies on protozoans, fungi, bacteria and the humane genome.

Automation and new technology in the clincal laboratory *edited by Kiyoshi Okuda was published by Blackwell Scientific Publications Ltd, Oxford, UK, 1990. ix + 318 pp. ISBN 0 632 02819 X. Price: GBP 42.50/USD 66.00; Affiliate Members Discount Price: GBP 31.85/USD 49.50.*

Poly(vinyl chloride)

Volume 29 of *Makromol. Chem. Macromol. Symp.* (1989) contains 10 invited main lectures, nine invited short specialized lectures and seven extended poster contributions presented at the IUPAC-sponsored 31st Microsymposium on Macromolecules: Poly(vinyl chloride) held in Prague, Czechoslovakia, 18–21 July 1988.

The contributions cover quantum chemical calculations, polymerization technology, chemical modification, degradation and stabilization of PVC. The symposium editor was Dr J. Kahovec (Prague) who is responsible for the National Centre in Czechoslovakia and for distribution of provisional IUPAC recommendations.

Dr J. Kahovec.

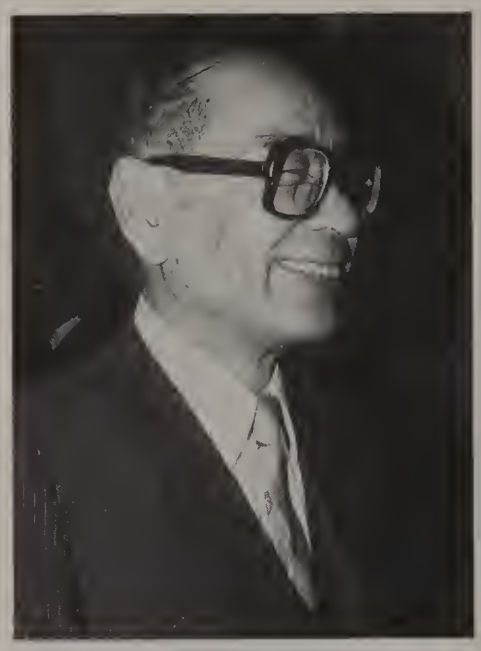
One-shot block co-polymerization

Volume 32 of *Makromol. Chem. Macromol, Symp.* (February 1990) contains the texts of invited lectures presented at the IUPAC sponsored 11th International Symposium on Cationic Polymerizations and Related Ionic Processes held in Strasbourg, France, 5–9 June 1989.

The first paper in this volume is by Takeo Saegusa and three colleagues at Kyoto University, Japan. Saegusa is past-president of the Macromolecular Division of IUPAC.

The paper describes a new method for block co-polymer preparation in which a mixture of two monomers is subjected to polymerization (by simultaneous feeding) with the aid of an initiator. The new method was applied to the polymerization of a family of 2-oxazolines. This proceeds via electrophilic propagating species.

According to Saegusa, the key to block co-polymer formation with one-shot feeding of monomers is the difference in polymerization reactivity (nucleophilicity) between the two monomers. First, the monomer of higher reactivity



Takeo Saegusa.

is polymerized to completion, and then the monomer of lower reactivity is polymerized starting from the propagating species of the first polymerization.

ISO Standards

The following are some of the new international standards announced by the International Organization for Standardization (ISO) in recent issues of *ISO Bulletin*.

April 1990 issue of *ISO Bulletin:*

TC 6	**Paper, board and pulps**
ISO 9668: 1990	Pulps — Determination of magnesium content — Flame atomic absorption spectrometric method
TC17	**Steel**
ISO 9658: 1990	Steel — Determination of aluminium content — Flame atomic absorption spectrometric method
ISO/TR9769: 1990	Steel and iron — Review of available methods of analysis
TC 20	**Aircraft and space vehicles**
ISO 8829: 1990	Aerospace — Polytetrafluorethylene (PTFE) hose assemblies — Test methods
TC 26	**Copper and coppy alloys**
ISO 2624: 1990	Copper and coppy alloys — Estimation of average grain size
TC 28	**Petroleum products and lubricants**
ISO 6743-11 1990	Lubricants, industrial oils and related products (class L) — Classification — Part 11: Family P (Pneumatic tools)
TC 45	**Rubber and rubber products**
ISO 125: 1990	Natural rubber latex concentrate — Determination of alkalinity

ISO 2027: 1990	Natural rubber latex concentrate, evaporated, preserved — Specification
ISO 5978: 1990	Rubber- or plastic-coated fabrics — Determination of blocking resistance
TC 61	**Plastics**
ISO 1628-6: 1990	Plastics — Determination of viscosity number and limiting viscosity number — Part 6: methyl methacrylate polymers
TC 79	**Light metals and their alloys**
ISO 6361-2: 1990	Wrought aluminium and aluminium alloy sheets, strips and plates — Part 2: Mechanical properties
TC 106	**Dentistry**
ISO 8891: 1990	Dental casting alloys with noble metal content of 25% up to but not including 75%
TC 146	**Air quality**
ISO 8760: 1990	Work-place air — Determination of mass concentration of carbon monoxide — Method using detector tubes for short-term sampling with direct indication
TC 160	**Glass in building**
ISO 9050: 1990	Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance and ultraviolet transmittance, and related glazing factors

May 1990 issue of *ISO Bulletin:*

TC 45	**Rubber and rubber products**
ISO 3303: 1990	Rubber- or plastic-coated fabrics — Determination of bursting strength
TC 61	**Plastics**
ISO 4578: 1990	Adhesives – Determination of peel resistance of high-strength adhesive bonds — Floating roller method
TC 79	**Light metals and their alloys**
ISO 6362-2: 1990	Wrought aluminium and aluminium alloy extruded rods/bars, tubes and profiles — Part 2: Mechanical properties
TC 102	**Iron ores**
ISO 9508: 1990	Iron ores — Determination of total iron content — Silver reduction titrimetric method
TC 138	**Plastic pipes, fittings and valves for the transport of fluids**
ISO 8584-1: 1990	Thermoplastics pipes for industrial applications under pressure — Determination of the chemical resistance factor and of the basic stress — Part 1: Polyolefin pipes
TC 147	**Water quality**
ISO 8466-1: 1990	Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 1: Statistical evaluation of the linear calibration function
TC 175	**Fluorspar**
ISO 6676: 1990	Acid-grade and ceramic-grade fluorspar — Determination of total phosphorus content — Reduced-molybdophosphate spectrometric method
ISO 9779: 1990	Metallurgical-grade fluorspar — Determination of lead content — Solvent extraction atomic absorption spectrometric method

ISO has recently published an international standard on the determination of transmittance through glass in buildings.

June 1990 issue of *ISO Bulletin:*

TC 34	**Agricultural food products**
ISO 7562: 1990	Potatoes — Guidelines for storage in artificially ventilated stores
ISO 7698: 1990	Cereals, pulses and derived products — Enumeration of bacteria, yeasts and moulds
ISO 9526: 1990	Fruits, vegetables and derived products — Determination of iron content by flame atomic absorption spectrometry
TC 35	**Paints and varnishes**
ISO 9117: 1990	Paints and varnishes — Determination of through-dry state and through-dry time — Method of test
TC 37	**Terminology (principles and co-ordination)**
ISO 1087: 1990	Terminology — Vocabulary
TC 61	**Plastics**
ISO 305: 1990	Plastics — Determination of thermal stability of poly(vinyl chloride), related chlorine-containing homopolymers and copolymers and their compounds — Discoloration method
TC 74	**Cement and lime**
ISO 863: 1990	Cement — Test methods — Pozzolanicity test for pozzolanic cements
TC 91	**Surface active agents**
ISO 2174: 1990	Surface active agents — Preparation of water with known calcium hardness
ISO 4325: 1990	Soaps and detergents — Determination of chelating agent content — Titrimetric method
TC 107	**Metallic and other inorganic coatings**
ISO 9717: 1990	Phosphate conversion coatings for metals — method of specifying requirements
TC 147	**Water quality**
ISO 5814: 1990	Water quality — Determination of dissolved oxygen — Electrochemical probe method
ISO 7027: 1990	Water quality — Determination of turbidity
ISO 9174: 1990	Water quality — Determination of total chromium — Atomic absorption spectrometric methods

IUPAC Accounts for 1989

The audited IUPAC accounts for 1989 are preceded by the auditors' report and an introduction by IUPAC Treasurer Anders Björkman.

Comments on accounts

The accounts are not easy reading and provide no more than an overview of the use of IUPAC funds. The audit serves to prove that, by detailed control, the money has been used for IUPAC purposes only. 1989 is the second year within a biennium with budgets prepared by the Treasurer.

A comparison of the 1989 accounts with the budget for 1989 (see *IUPAC Handbook 1987–1989*, pp. 221–2) is not a straightforward matter because the budget cannot be established with as many detailed items. In addition, the biennial budgets for 1988/9 present a somewhat different picture with regard to the distribution of income and expenditure items when compared with the corresponding accounts.

However, it is still possible to examine the performance in 1989 in order to appraise financially the management of the activity plans behind the budget. A major observation is the inversion of a planned 'deficit' (excess of expenditure over

income) of USD 86 000 to a 'surplus' (excess of income over expenditure) of about USD 53 000. One of the factors behind such a favourable financial outcome is the conservative nature of the budget. For example, the General Assembly in Lund cost about USD 70 000 less than the estimated figure. Also the combined income from assets and from publications was about 90 000 higher than estimated. In addition, not all IUPAC bodies used up the money allocated to them.

These gains were offset by some increased expenditure which could hardly have been foreseen, mainly an increase of office expenses (about USD 67 000) which are partly linked to the currency exchange rate between USD and GBP.

By and large the financial outcome of 1989 may be considered to be reasonable. Nevertheless, a total excess of income over expenditure in the biennium 1988/89 of USD 86 000 (= 33 000 + 53 000) is not called for, when the level of assets is already above the minimum of the sum of expenditure in the biennium. Thus, this 'surplus' — if known — could possibly have been employed for additional activities, though late in the biennium (conversely, a 'deficit' could hardly have been eliminated). It is our hope, now that the accounting has moved from Zürich to Oxford, that we will no longer have to wait with vague ideas about the financial balance until February of the following year.

Anders Björkman: Treasurer

As announced at the Council meeting of the General Assembly in Lund last year, computerized accounting became operational at the Oxford Secretariat in January 1990. This replaced accounting at the bank in Zürich although handling of income and expenditure payments as well as assets still remains with the bank, and the formal audit report is still issued in Zürich.

The accounting system at Oxford is still being developed and as yet is not fully functional with regard to routines and reports — but is should be operating satisfactorily by the end of 1990. It is regrettable that it has taken so long to reach this goal.

In 1991 it is planned to introduce a reasonable amount of management accounting to allow more flexible and complete use of funds as well as the avoidance of a 'deficit' balance — but I would be going too far to comment on this matter here.

The level of outstanding subscriptions is about the same as in 1988. This is acceptable as the risk of non-payment is small. A considerable portion (USD 33 800) of the provision for writing-off bad debts has been used because Romania has failed to pay subscriptions for three years and has left the Union. However, the political scene has changed and Romania may return as a member.

The CHEMRAWN Rolling Fund is almost exhausted with USD 1828 left on the balance sheet. A transfer of USD 10 000 to the fund is included in the 1990/91 biennial budget, but the fund may go into the red until other money becomes available. Back payment to the fund is allowed for in the budgets of forthcoming CHEMRAWN conferences (CHEMRAWN VII will take place at the end of 1991).

Conversely, it is noted that the provision for affiliate activities has increased from USD 4555 in 1988 to USD 18 744. In the budget, a transfer of USD 7000 to the affiliate membership programme (AMP) budget in addition to the USD 5000 given to developing countries was foreseen. It could indicate that AMP is now self-supporting, but this matter is not as easy as that, because the AMP is financially coupled to the contract/negotiations with Blackwell Scientific Publications.

Anders Björkman
Treasurer

Auditors' Report

As auditors of the International Union of Pure and Applied Chemistry we have examined the accounts for the year ended 31 December 1989 in accordance with the provisions of Swiss law. Our examination included a review of the accounting records at the Union's Secretariat in Oxford.

We have come to the conclusion that:

- the balance sheet and statement of income and expenses are in agreement with the books;
- the books of account have been properly kept;
- the financial position and the result of operations are presented in accordance with the principles of evaluation prescribed by Swiss law and the requirements of the statutes.

As a result of our examination we recommend that the accounts submitted to you be approved.

Neutra Treuhand AG

Balance Sheet as at 31st December 1989 (expressed in USD)

Assets		
Cash in Banks		
US Dollars	45 701.04	
Sterling	39 919 00	
Swiss Francs	3 714.00	
German Marks	358.00	
Money Market Investments	727 743.00	
Cash in East European Bank[a]	9 888.50	818 323.54
Marketable Securities at Cost		1 462 881.73
Accounts Receivable[b]		27 696.96
Sundry Debtor		40 953.00
Subscriptions, etc. Outstanding[c]		
National Organizations	90 143.00	
Observer Countries Service Charges	50.00	
Company Associate Service Charges	675.00	90 868.00
		2 440 723.23

Liabilities		
Capital Account		2 193 715.63
Accounts Payable[d]		2 851.59
Paulo Franzosini Fund		5 659.20
Provisions		
Committed Expenditure	5 408.00	
Bad Debts	62 693.50	
CHEMRAWN Rolling Fund[e]	1 828.60	
Neutra Examination	4 000.00	
Affiliate Activities[f]	18 744.27	
Publication Activities	3 109.00	
Seminars, IVPs[g]	107.00	
History of IUPAC	20 000.00	
IUPAC Handbook 1987–9	1 050.00	
Roy. Soc. Contribution to Dev. Country Activ.	2 000.00	
Toxiciology Glossary	723.00	
Contribution to ICSU 1989[h]	11 155.50	130 818.87
Excess of Income over Expenditure	53 136.09	
Depreciation/Profit on Sold Securities and Swap	54 541.85	107 677.94
		2 440 723.23

Notes for 1989 Balance Sheet

(a) *Cash in East European Banks*

Bulgaria	442.50
Czechoslovakia	6 886.00
Hungary	220.00
Poland	1 416.00
USSR	972.00
	9 936.00

(b) *Accounts Receivable*

Swiss Computational Tax	10.00
List Zürich	27 686.96
	27 696.96

(c) *Subscriptions, etc. Outstanding*

National Organizations (1985)		
Belgium	8 500.00	
National Organizations (1988)		
Argentina	100.00	
Belgium	10 150.00	
Egypt	1 093.00	
Iraq	2 600.00	
Ireland	1 600.00	15 543.00
National Organizations (1989)		
Argentina	4 800.00	
Belgium	11 800.00	
Cuba	700.00	
Greece	1 400.00	
India	10 400.00	
Iraq	2 600.00	
Ireland	1 400.00	
Japan	30 200.00	
Peru	700.00	
Portugal	2 100.00	66 100.00
Service Charges		
Company Associates (1988)		
UK		125.00
Service Charges		
Company Associates (1989)		
Greece	25.00	
Italy	25.00	
UK	500.00	550.00
Service Charges		
Observer Countries (1989)		
Jamaica		50.00
		90 868.00

(d) *Accounts Payable*

List Zürich	1 596.58
List Oxford	1 180.01
Advanced Payments 1990	75.00
	2 851.59

(e) see CHEMRAWN Income and Expenditure Statement.

(f) See Affiliate Membership Programme Income and Expenditure Statement.

(g) IUPAC Visiting Professorships.

(h) Payment deferred until 1990.

Statement of General Income and Expenditure for Year ended 31st December 1989 (expressed in USD)

Expenditure

Office Expenses		
IUPAC Officers	7 876.90	
IUPAC Secretariat (non-publications)	223 963.11	
Audit, Bank Fees, Other Charges	50 545.16	282 385.17
Expenses, IUPAC Bodies		
Administration Expenses	15 598.88	
Meetings		
Other than General Assembly	82 193.77	
General Assembly	481 502.42	579 295.07
Symposia, Seminars, IVPs		500.00
Bad Debts Write Off		33 800.00
Provisions Made		
Contribution to ICSU	11 155.50	
Bad Debts	25 000.00	
Neutra Provisions	4 000.00	
Toxicology Glossary	723.00	40 878.50
Other Expenses		
ICSU Grant	1 000.00	
Contributions to ICSU	706.00	
Representatives Other Organizations	8 157.72	
Transfer to Publications Subaccount for Blackwell Purchases and IUPAC Handbook	14 624.00	
Transfer for Affiliates in Dev. Countries	5 000.00	
Income Tax UK[a]	8 721.49	
Miscellaneous Expenses	1 101.58	39 310.79
Foreign Exchange Differences[b]		30 106.33
Excess of Income over Expenditure		53 136.09
		1 059 411.95

Income

National Subscriptions		
Received	392 111.48	
Outstanding	66 100.00	458 211.48
Company Associate Service Charges		
Received	5 750.00	
Outstanding	550.00	6 300.00
Observer Countries Service Charges		
Received	600.00	
Outstanding	50.00	650.00
Interest and Dividends Earned and Capital Gain Realized[c]		195.690.72
Subvention/Grants from ICSU		16 856.00
Transfer from Publication Subaccount		159 252.75
Transfer from Publication Activities		3 109.00
Withdrawals from Provisions		
Committed Expenditure	162 592.00	
Bad Debts	33 800.00	
IUPAC Handbook	13 950.00	
Neutra Provision	8 000.00	218 342.00
Other Income		
Unesco Contracts		1 000.00
		1 059 411.95

Notes for statement of General Income and Expenditure for the Year ended 1st December 1989

(a) This tax is a once only payment, following too large transfer of assets to the local bank in Oxford.

(b) Currency fluctuations of GBP, CHF and DEM relative to USD, used for accounting, produce a loss (or gain).

(c) The words 'Capital Gain Realized' have, by error, not been included in the text previously. USD 481.00 interest on capital of Paulo Franzosini Fund already deducted.

Statement of Publication and Expenditure for Year ended 31st December 1989 (expressed in USD)

Expenditure		
IUPAC Secretariat (publications)		121 017.00
Blackwell Purchases and IUPAC Handbook		14 624.00
Solubility Data Series		
Expended	2 287.47	
Provision Made (overspent)	−79.47	2 208.00
Provision for Publication Activities		3 109.00
Miscellaneous Expenditure		18 048.65
Transfer to General Income and Expenditure Account		159 252.75
		318 259.40

Income		
Publications		
Blackwell	260 409.61	
Pergamon	15 048.80	
Other Publishers	7 111.32	
Secretariat	35.00	282 604.73
Support of Publication Activities by Blackwell and Pergamon		13 000.00
Transfer for Blackwell Purchases and IUPAC Handbook		14 624.00
Solubility Data Series		
Last Year's Provision	1 820.83	
Income	387.17	2 208.00
Last Year Provision for Publication Activities		3 805.00
Miscellaneous Income		2 017.67
		318 259.40

Statement of Affiliate Membership Programme Income and Expenditure for Year ended 31st December 1989 (expressed in USD)

Expenditure	
IUPAC Secretariat (AMP)	25 661.00
Miscellaneous Expenses	8 454.75
Chemistry International and Leaflets	54 007.50
Transfer to Provision for Affiliate Activities	18 744.27
	106 867.52

Income	
Contributions	
In USD	86 955.59
In Foreign Exchange	5 436.00
Royalties Blackwells	4 920.38
Transfer for Affiliates in Dev. Countries from General Income and Expenditure Account	5 000.00
Transfer from Provision for Affiliate Activities	4 555.55
	106 867.52

Statement of CHEMRAWN[a] Income and Expenditure for Year ended 31st December 1989 (expressed in USD)

Expenditure		Income	
Miscellaneous Expenses	5 992.66	*Transfer from Provision for*	
CHEMRAWN VII Inception Money[b]	12 500.00	*CHEMRAWN Rolling Fund*	18 492.66
	18 492.66		18 492.66

Notes

(a) CHEMRAWN = CHEMical Research Applied to World Needs
(b) This money is to be regained by an allowance by the CHEMRAWN Rolling Fund in the budget of CHEMRAWN VII.

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(a) Bonds							
5.75% Deutschland 1986–20.6.96	DEM	200 000		90.75	107 367	108 473.00	– 1 106.00
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6% UBS 1985–27.11.92	USD	150 000		92.75	139.125	134 352.11	+ 4 772.89
7.75% IBM 30.3.91	USD	100 000		99.00	99 000	100 424.85	– 1 424.85
7% Schweden 1987–12.2.92	USD	125 000		97.125	121 406	119 524.43	+ 1 881.57
4.625% Nagasakiya 1987–12.3.92	CHF	100 000		93.00	60 389	66 447.00	– 6 058.00
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11.375% Connecticut Savings 26.2.90	USD	60 000		100.50	60 300	60 560.17	– 260.17
Sub-Total Bonds					970 542	933 494.73	+ 37 047.27
(b) Shares							
Shs Fidelity Magellan Fund		8 301.18	USD	59.85	496 825	396 860.00	+ 99 965.00
Parts UBS Money Market Trust		200	GBP	409.82	131 494	132 527.00	– 1 033.00
Total					1 598 861	1 462 881.73	+ 135 979.27

Conference Calendar

Conference circulars and registration forms for the IUPAC-sponsored conferences listed below may be obtained, upon request, from the names and addresses shown in brackets.

1990

Mycotoxins and phycotoxins

4–15 November. International Symposium and Workshop on Mycotoxins and Phycotoxins. Cairo, Egypt.
(Prof. Khayria Niguib, National Research Centre, Dokki, Cairo, Arab Republic of Egypt.)

Latin American Chemistry Congress

5–9 November. 19th Latin American Chemistry Congress. Buenos Aires, Argentina.
(XIX Congreso Lationamericano de Química, Sección Comunicaciones, Sánchez de Bustamante 1749, (1425) Buenos Aires, Argentina.)

Speciality polymers

7–9 November. International Symposium on Speciality Polymers. Singapore.
(Secretary, IUPAC Symposium Organizing Committee, c/o Department of Chemistry, National University of Singapore, Singapore 0511, Republic of Singapore. Fax: +65 7791691.)

1991

Polymer materials

10–15 February. Polymer 91: International Symposium on Polymer Materials: Preparation, Characterization and Properties. Melbourne, Australia.
(Dr G. B. Guise, Polymer 91 Secretary, PO Box 224, Belmont, Victoria 3216, Australia. Tel: +61 (52) 47 2695. Fax: +61 (52) 217971.)

Organic chemistry: technological perspectives

14–19 April. 2nd International Symposium 'Organic Chemistry: Technological Perspectives'. Baden-Baden, FRG.
(Gesellschaft Deutscher Chemiker, Abt. Tagungen, PO Box 90 04 40, D-6000 Frankfurt/Main 90, FRG.)

Pharmaceutical and biomedical analysis

28 April–1 May. 3rd International Symposium on Pharmaceutical and Biomedical Analysis. Boston, MA, USA.
(Dr S. H. Y. Wong, Director, Drug Analysis Division, University of CT Health Center, 263 Farmington Avenue, Farmington, CT 06032, USA.)

How to apply for IUPAC sponsorship

To apply for IUPAC sponsorship, conference organizers should write to the IUPAC Secretariat (see inside back cover for address) requesting an Advanced Information Questionnaire (AIQ). Completed AIQs should be returned to the Secretariat preferably **2 YEARS** and at least 12 months before the conference. Late applications will not be considered. Further information on granting of IUPAC sponsorship was published in *CI*, Vol. 11, No. 1, pp.4–5, 1989.

Vapor–liquid equilibrium

13–17 May. 6th International Workshop on Vapor–Liquid Equilibrium in 1-Alkanol + *n*-Alkane Mixtures. Liblice, Czechoslovakia.
(Prof. R. Holub, Vysoka Skola Chemicko-Technologicka, Katedra Fyzikalni Chemie, Suchbatarova 5, 166–28 Prague, Czechoslovakia.)

Spectroscopy

9–14 June. 17th Colloquium Spectroscopicum Internationale. Bergen, Norway.
(17th Colloguium Spectroscopicum Internationale, HSD Congress — Conference, PO Box 1721 Nordnes, N. 5024 Bergen, Norway.)

Calorimetry and chemical thermomdynamics

24–28 June. International Symposium on Calorimetry and Chemical Thermodynamics. Moscow, USSR.
(Prof. L. V. Gurvich, Thermocenter of the USSR Academy of Sciences, IVYAN, Izorskaya St. 13/19, Moscow 127412, USSR.)

Surface and Colloid Science

14–19 July. 10th International Conference on Computers in Chemical Research and Education. Jerusalem, Israel.
(Prof. Y. Wolman, Department of Organic Chemistry, The Hebrew University, Jerusalem 91904, Israel.)

Solution chemistry

14–19 July. 22nd International Conference on Solution Chemistry. Linz, Austria.
(Prof. G. Gritzner, Institut für Chemische Technologie, Anorganischer Stoffe, Johannes Kepler Universität Linz, A-4040 Linz-Auhof, Austria.)

Rheology of polymer melts

15–18 July. 14th Discussion Conference on Macromolecules Rheology of Polymer Melts. Prague Czechoslovakia.
(14th Discussion Conference, PMM Secretariat, c/o Institute

of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 162 06 Prague, Czechoslovakia. Tel: +42 (2) 360341. Fax: +42 (2) 367981. Telex: 122019 IMCP C.)

Coordination chemistry

19–24 July. 29th International Conference on Coordination Chemistry. Lausanne, Switzerland.
(Prof. A. E. Merback, Institut de Chimie Minerale et Analytique, Universite de Lausanne, Place du Chateau 3, Ch-1005 Lausanne, Switzerland.)

IUPAC Congress

17–22 August. 33rd IUPAC Congress. Budapest, Hungary.
(33rd IUPAC Congress, Prof. E. Pungor, c/o Hungarian Academy of Sciences H-1111 Budapest, Gellért tér 4, Hungary. Tel: + 36 (1) 851 477 Telex: 225931 MUEGY H.)

Organometallic chemistry

25–29 August. 6th International Symposium on Organometallic Chemistry Directed Toward Organic Synthesis (OMCOS). Utrecht, The Netherlands.
(Symposium Secretariat OMCOS 6, Congress Bureau, Royal Netherlands Industries Fair, PO Box 8500, 3503 RM Utrecht, The Netherlands.)

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy.

IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than 3 months in advance. If a visa is not granted 1 month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

In the case of the 32nd IUPAC Congress (Stockholm, Sweden: 2–7 August 1989), it was observed that the time for treating visa applications in Sweden may be as long as 5–6 weeks. To this must be added the time for handling the applications at the Swedish Embassy in the various countries of the intending participants. This confirms the need for applications to be made not less than 3 months in advance.

Plasma chemistry

29 July–4 August. 10th International Symposium on Plasma Chemistry. Jerusalem, Israel.
(Prof. R. Avni, Conseiller Scientifique, Ambassade d'Israel, 3 rue Rabelais, F-75008 Paris, France.)

IUPAC General Assembly

7–15 August. 36th IUPAC General Assembly. Hamburg, FRG
(The IUPAC General Assembly is not open for general participation but restricted to members of IUPAC bodies that meet on this occasion.)

Chemical education

25–30 August. 11th International Conference on Chemical Education. York, UK.
(Prof. D. J. Waddington, Department of Chemistry, University of York, Heslington, York YO1 5DD, UK.)

Analytical sciences

25–31 August. International Congress on Analytical Sciences. Chiba, Japan.
(ICAS '91 Secretariat, The Japan Society for Analytical Chemistry, 1–26–1, Nishigotanda, Shinagawa, Tokyo 141, Japan.)

Cationic Polymerization

26–29 August. 10th International Symposium on Cationic Polymerization and Related Ionic Processes. Balatonfüred, Hungary.
(Prof. T. Kelen, Institute of Applied Chemistry, Kossuth Lajor Univesity, H-4010 Debrecen, Hungary.)

Spectroscopy of biological molecules

1–6 September. 4th European Conference on the Spectroscopy of Biological Molecules. York, UK.
(Prof. R. E. Hester, Department of Chemistry, Univesity of York, York YO1 5DD, UK.)

Mössbauer effect

16–20 September. International Conference on the Applications of the Mössbauer Effect. Nanjing, China.
(Prof. Yuanfu Hsia, ICAME '91, Department of Physics, Nanjing University, Nanjing 210008, China.)

Electron spin echo spectroscopy

25–28 September. International Workshop on Electron Echo Spectroscopy. Novosibirsk, USSR.
(Prof. Yu. D. Tsvetkov, Institute of Chemical Kinetics & Combustion, Novosibirsk 630090, USSR.)

Macromolecule–metal complexes

30 September–5 October. 4th International Symposium on Macromolecule–Metal Complexes. Siena, Italy.
(Prof. R. Barbucci, Dipartimento

di Chimica, Università di Siena, Piano dei Mantellini 44, 53100 Siena, Italy.)

CHEMRAWN VII

2–6 December. World Conference on Chemistry of the Atmosphere: Its Impact on Global Change. Baltimore, Maryland, USA.
(Prof. Robert Sievers, Director of CIRES, Campus Box 216, University of Colorado, Boulder, CO 80309-0216, USA.)

New Polymers

30 November–1 December. International Symposium on New Polymers. Kyoto, Japan.
(Prof. Toshinobu Higashiura, Department of Polymer Chemistry, Kyoto University, Yoshida, Sakyo-ku, Kyoto 606, Japan.)

1992

Organic synthesis

5–9 July. 9th International Conference on Organic Synthesis. Montréal, Québec, Canada.
(Prof. Jean-Claudé Richer, Départment de Chimie, Université de Montréal, CP 6128 Succursale A, Montréal, Québec H3C 3J7, Canada.)

Ring opening polymerization

7–12 July. International Symposium on Ring Opening Polymerization. Warsaw, Poland.
(Prof. Zbigniew J. Jedlinski, Institute of Polymer Chemistry, Polish Academy of Sciences, 34 M. Curie Sklodowska St., 41-300 Zabrze, Poland.)

Risk management of chemicals

13–16 July. International Symposium on Risk Management of Chemicals: Can Chemicals be Used Safely? Guildford, UK.
(Dr J. F. Gibson, Secretary (Scientific), The Royal Society of Chemistry, Burlington House, London W1V 0BN, UK. Tel: +44 (71) 4378656.)

Macromolecules

13–18 July. 34th International Symposium on Macromolecules. Prague, Czechoslovakia.
(IUPAC Macro 92 Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Heyrovského nám. 18882/2, 16206 Prague 6, Czechoslovakia. Tel: +42 (2) 360317. Telex: 122019 IMCP C.)

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IUPAC Handbook 1989-1991

Published for the International Union of Pure and Applied Chemistry
by Blackwell Scientific Publications Ltd

The 1989-1991 IUPAC Handbook contains not only the membership of Standing Committees, Divisions, Commissions, etc., but also the projects on which the IUPAC bodies are working. The Statutes and Bylaws of the Union and the Rules and Terms of Reference of the Divisions/Commissions are reproduced in toto. The Handbook is intended to provide detailed information on the membership, working programmes of the Union, and rules of operation in one volume, and will be a useful reference source for chemists and chemical organizations worldwide.

IUPAC

Outline of Contents: Organization of IUPAC 1989-1991; Table of contents for membership lists; International Union of Pure and Applied Chemistry; IUPAC officers and secretariat; Past officers of IUPAC; General assemblies and congresses of IUPAC; Membership lists of IUPAC bodies 1989-1991: National adhering organizations; Observer countries; Associated organizations; Company associates; Executive committee and bureau; Standing committees; Division/Section and their commissions, subcommittees, working parties and sub-groups; Standing orders from executive committee; Alphabetical index to members of IUPAC bodies 1989-1991; Current programmes 1990: Guidelines for IUPAC programmes; Standing committees; Divisions; Section; Appendix I - Reports published 1988-1989; Appendix II - Guidelines for applying for sponsorship of symposia, financial subventions for IUPAC-sponsored symposia, symposia sponsored by IUPAC (since 1 May 1990); Appendix III - Procedure for comment and approval of IUPAC recommendations on nomenclature and symbols, guidelines for drafting IUPAC Recommendations 1990; Statutes and Bylaws; Appointment and functioning of national representatives; Rules of divisions: terms of reference for divisions/sections and commissions; Affiliate membership programme; List of abbreviations; Stop Press.

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=> s thiophosgene/cn
L1            1 THIOPHOSGENE/CN

L1  ANSWER 1 OF 1

MF   C Cl2 S
CN     ***thiophosgene***

SO   0-03-00-00134; 4-03-00-00281; 3-03-00-00246; 2-03-00-00105;
     1-03-00-00063; 5- 3
RN   463-71-8; 98537-06-5
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=> s ccl2s/mf
L2           10 CCL2S/MF

L2  ANSWER 1 OF 10
AN  32357  GFI
MF  C Cl2 S
CT  purification
CIT C: MVol.D6; p. 146/7

CIT C: MVol.D6
ELN Carbon (C)
TI  Carbon-Sulfur Compounds. Carbon-Selenium and Carbon- Tellurium
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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries;
- to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;
- to co-operate with other international organizations which deal with topics of a chemical nature;
- to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 45 countries, each represented by a national organization, such as an academy of science or research council.

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Chemistry International

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